SOUTHERN CALIFORNIA ASSOCIATION OF MARINE INVERTEBRATE TAXONOMISTS

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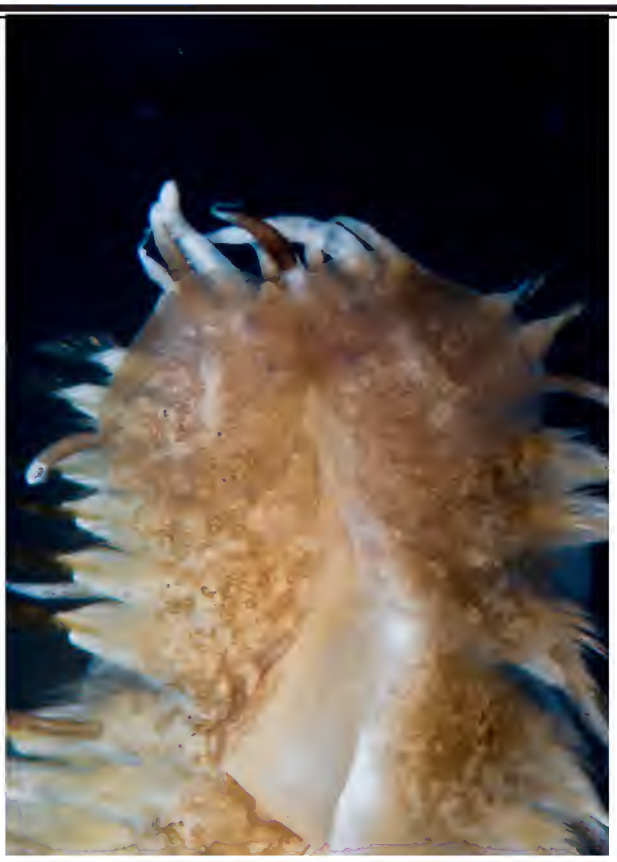

Ysideria hastata - Photo by Ricardo Martinez-Lara

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The SCAMIT newsletter is not deemed to be a valid publication for formal taxonomic purposes.

10 MAY 2010, SCAMIT DNA BARCODING IDENTIFICATION WORKSHOP, LACSD.

The DNA Barcoding workshop was well attended with many POTW, SCCWRP, and NHMLAC staff participating. Attendees were: Don Cadien, Larry Lovell, Lily Sam, Dan Ituarte, Kathy Langan, Katie Beauchamp, Megan Lilly, Nick Haring, Ricardo Martinez-Lara, Ron Velarde, Wendy Enright, Tony Phillips, Kristin Meagher, Kathy Omura, Leslie Harris, Christina Thomas, Kelvin Barwick, Ken Sakamoto, Mike McCarthy, Peter Miller, and Valerie Raco-Rands.
President, Larry Lovell, opened the meeting with SCAMIT business, upcoming meetings, and announcements. He then introduced Dr. Peter Miller from SCCWRP.

UPCOMING MEETINGS

13 June 2011 - at the NHMLAC, 9:30-3:30. Oligochaetes with Dr. Joshua Mackie CSUSJ.

July 2011 - no meeting is scheduled as this is a busy field month for local POTW staff.

15 Aug 2011 - at SCCWRP in the large conference room, 9:30-3:30. Morphbank image submittal workshop. Deb Paul, Morphbank FSU, will visit us to lead another workshop on Morphbank image submittal.

12 September 2011 - at Lilly Pad Environmental, Escondido, CA (directions to Megan's address to follow), 9:30-3:30. Megan Lilly and Tony Phillips will lead a workshop on Enteropneusta. Those who plan to attend are asked to use their July field sampling events to pull specimens for special handling and preservation during collection. That way materials in excellent condition will be available for the meeting. We hope to improve the level of identification for this group.

Peter presented a Powerpoint presentation with an overview of the SCCWRP DNA barcoding project. He outlined the long-term objective of building a library of barcodes for offshore benthic species to support whole sample barcode analysis as a bioassessment tool. He presented the rational for using CO1 as a preferred genetic marker, being a mitochondrial gene and having about 650 base pairs. Examples of the Guelph data input spreadsheets for field collection, species identification, well-plate tracking, and image information that will be used during the workshop, were projected and discussed. Peter introduced Valerie Raco-Rands who has been assigned to work with him on the project. He expressed his appreciation for the field efforts of the POTW's for collecting the samples and making them available for processing.

Larry then oriented everyone to the layout of the room and workflow proposed for the day. Participants were assigned or volunteered to work at the duplicate taxonomy, photography, well-plate tissue pulling, and computer spreadsheet input stations. Following tissue pulling, the labeled voucher specimens were given to the NHMLAC staff on hand for curation.

Sorted samples in 95% EtOH from SCCWRP (Bight '08), LACSD, CLAEMD, OCSD, and CSD were available for processing. Taxonomists covering all major taxa began pulling specimens that were easy to identify, labeling them and passing them to the photography station. One or more photographs were shot of each specimen, then the specimen was moved to the DNA tissue pulling station where a piece of tissue was removed and placed in the appropriate well-plate hole. The information for a specimen was then passed to the computer station where the information relating to that specimen was entered into the spreadsheet. The vial with the specimen was passed to the NHMLAC station where it was properly archived and curated by museum staff. A total of ninety-six specimens were processed at the workshop. Barcode results will be forthcoming and available at BOLD.

This workshop was an opportunity for SCAMIT members to see first hand the complete steps in DNA barcoding specimen handling, from identification to museum curation. It also allowed us to make some initial progress toward building the DNA barcode library of Southern California benthic invertebrates.

14 JUNE 2010, SCAMIT IMAGING WORKSHOP, CSD – D. Ituarte

The purpose of this workshop is to demonstrate methods of capturing, organizing, and editing your images with the least effort, and with non-destructive methods. Several programs are recommended including Adobe Photoshop, Adobe Bridge, Adobe Camera Raw, Nikon Capture NX2, Adobe Lightroom, and Apple Aperture.

Introduction

William Henry Talbot was the inventor of photography using silver, and the negative to positive method of printing. Being a botanist and a scientist among other things, some of his first images were of plants. It was his goal to find a method of creating images that could be transferred to ink and used for documentary purposes. He perfected the optical and chemical aspects of photography, and learned to use the new medium to make complex images for the botanist, historian, traveler, and artist. As a botanist, Talbot clearly wanted to use his invention as a method for literary and taxonomic documentation. He stated: "Had early botanists been able to print fifty copies of each engraving, and had they sent them to distant colleagues, it would have greatly aided modern botanists in determining the plants intended by those authors, whose descriptions are frequently so incorrect that they are like so many enigmas, and have proved a hindrance and not an advantage to science." He only partially succeeded in his quest to use photography for documentation. However, these goals would be met by other photographers such as Karl Blossfeldt who used photography specifically for documentation of species of plants. His images were carefully lighted and photographed, printed with high quality, and documented with taxonomic information. The quality of his images should be used as an example of what we can and should attempt to achieve for taxonomic documentation of species. Today, we have superior equipment and software to achieve such quality. For more information on Talbot see: "William Henry Fox Talbot: [Dandelion Seeds] (2004.111)". In Heilbrunn Timeline of Art History. New York: The Metropolitan Museum of Art, 2000-present. http://www.metmuseum.org/toah/works-of-art/2004.111

Understanding Light

Color Temperature and the White Balance Mode in Digital Cameras

Color temperature is a standard method of describing colors for use in a range of situations and with different equipment. It is normally expressed in units called Kelvins (K). Color temperature means the temperature of an ideal black body radiator at which the color of the light source and the black body are identical (Jensen 2000). A black body is a theoretical radiator and absorber of energy at all electromagnetic wavelengths. When a black body is heated it emits color as it gets hotter. The first colors are red and yellow and eventually blue (Hirsch 1989). Digital cameras generally correct for color temperature when set to automatic balance. Daylight outdoor temperatures are blue and have temperatures of 5000 – 6500 degrees Kelvin. Tungsten light temperatures can vary from 2500 to 3500 degrees Kelvin. Setting the camera to 5000 K (daylight) while shooting indoors will result in a yellow cast. If the automatic features of the camera do not completely correct for white balance while photographing invertebrates with tungsten lighting, the result will be a yellow image. Fortunately, imaging programs such as Adobe Photoshop,

Adobe Lightroom, and Capture NX2 can correct for color temperature. Color casts caused by color temperature can also be corrected using either lens filters or a different light source. Flash units produce daylight color temperatures (5000 degrees Kelvin) and reduce the need for significant color correction when setting the camera to automatic white balance.

Color Theory

Three principal types of cones in the eye are sensitive to red, blue and green light (De Grandis 1986). These primary colors produce new colors when mixed additively. The sum of two colors with similar spectral wavelengths of light gives a color midway between the two. In order to identify the wavelength of a given color and its degree of saturation, reference is made to a flat, horseshoe-shaped diagram, proposed and worked out by the **Commission internationale de l'éclairage** (CIE) in 1931. The "horseshoe" represents the pure (spectral) colors, and inside it all the non-spectral colors that are physically possible for the human eye to see. In the center is the position of the white light - the light supplied by the source. This is the "chromaticity diagram" or the CIE triangle. Color temperatures can be correlated with those of the CIE triangle. This triangle is sometimes referred to as the color gamut of the human eye. See Fig. 2 (also see *www.**adobe**.com/digitalimag/pdfs/phscs2ip_col**space**.pdf*).

Color Working Space

The colors produced by video, television, photography, cinema and printing are found within the CIE triangle. Adobe RGB (1998) and sRGB are two of the most common working spaces used in digital photography (Eismann and Duggan 2007). sRGB is an RGB color space proposed by HP and Microsoft because it approximates the color gamut of most common computer display devices and serves as the color gamut of the typical monitor. It has become the standard color space for displaying images on the internet. sRGB's color gamut encompasses just 35% of the visible colors specified by CIE and is therefore one of the narrowest gamuts of any working space. It is broad enough for most color applications, but it is less than ideal for producing high quality images.

Adobe RGB (1998) was designed by Adobe Systems, Inc. to encompass most of the colors achievable on CMYK printers and is the most recommended color gamut of default color spaces (Eismann and Duggan 2007). The Adobe RGB 1998 working space encompasses roughly 50% of the visible colors of the CIE.

A much larger working space is ProPhoto RGB developed by Eastman Kodak as a way to describe all of the highly saturated colors that could be produced by E6 transparency films (Eismann and Duggan 2007). This color gamut is a good choice when working with RAW digital files because it is much larger than Adobe RGB and contains nearly all of the colors in the visible spectrum as well as some colors beyond it. While Adobe RGB (1998) will clip some of the more saturated colors captured in a raw file, ProPhoto RGB will tend to keep these colors since they are encompassed within the boundaries of its gamut. However, ProPhoto requires 16-bit files to ensure correct colors, and therefore should not be used with 8-bit files such as jpegs. Adobe RGB (1998) is a better choice for smaller files.

Additive and Subtractive Colors

An additive color model involves light emitted directly from a source or illuminant of some sort. The additive reproduction process uses red, green and blue light to produce the other colors (Hirsch 1989; Eismann and Duggan 2007). These are the primary (RGB) colors and are the colors used on monitors and cameras. Combining these additive primary colors in equal amounts produces the secondary CMY colors cyan, magenta and yellow. Combining all three primary

colors in equal intensities produces white as shown in the center of the RGB color diagram. Varying the luminosity of each color eventually reveals the full gamut of those three colors. The CYM colors are subtractive colors and in varying amounts subtract luminosity from the opposing primary colors. For example, yellow subtracts luminosity from blue, magenta subtracts luminosity from green, and cyan subtracts luminosity from red. Equal amounts of the CMY colors subtract all white light resulting in black as shown in the center of the CMY color diagram. The CMY colors are generally used for printing and are referred to as CMYK colors. The K stands for the small amount of black ink needed to produce a true black rather than a dark brown color. It is important to understand these color processes when working with imagery programs such as Photoshop. Color casts are created when one or more of these colors vary from those of the original subject matter or color temperature. See Fig. 3.

James Clerk Maxwell and the Tartan ribbon

These principals of additive color were first applied to photography by James Clerk Maxwell. He is credited as being the father of additive color (Hirsch 1989). He and Thomas Sutton photographed a tartan ribbon three times, first with red, then green, and then blue color filters over the lens. The three images were developed and then projected onto a screen with three different projectors, each equipped with the corresponding red, green, or blue color filter used to make the image. When brought into register, the three images formed a full color image, thus demonstrating the principles of additive color. This process is similar to that used in color slide film and digital imagery. Those of you who are familiar with channels in Photoshop may recognize this process of merging black and white images with brightness values for red, blue and green to produce a color image.

Color Theory and the Digital Camera

Capturing Light in Digital Cameras

Digital cameras apply the same color theory used by Maxwell and Sutton to produce a color image of the tartan ribbon. Two extremely mainstream digital imaging technologies are the Charged Coupled Device (CCD) and the Complementary Metal-oxide-semiconductor (CMOS). They are the imaging sensors that appear in nearly every type of digital camera on the market today. Although these two systems have a very different architecture they essentially capture photons and produce digital values. Kudenov (2003) describes the CCD as consisting of an array of small cells or pixels. Inside these cells are tiny photosensitive devices. These small devices are designed such that they will behave like "buckets" that will collect a charge and hold it until it is drained out of the system (i.e. it is directly analogous to a capacitor). These cells are created out of a semiconducting material that will give off free electrons when a photon of light strikes its surface. The more photons that hit the cell (i.e. the brighter the light for a given amount of time), the more electrons there are in the bucket; however, these cells are only sensitive to the light's intensity, not its color. Therefore the sensor is only detecting brightness values for filtered light – not a color. Brightness values are between 0 and 255 or one byte. These are the same brightness values used in levels and curves of Photoshop and other imaging software. To see a typical layout of a CCD device see the web page for Mike Kudenov:
http://ffden-2.phys.uaf.edu/212_fall2003.web.dir/Mike_Kudenov%20/ccd.htm

The CCD devices are arrayed on a plate similar to the film plane of a film camera. The cells consist of alternating colors of red and green, and blue and green such that there is a pattern of red, green, blue, green cells within a given rectangle of cells. Thus, there are 25% more green cells. This excess of green is advantageous, as our own eyes are much more sensitive to the color green than they are to blue and red. Also, blue tends to have more camera noise, red generally

has more contrast and green is between blue and red for both properties. The light intensity for each group of four sensors (red, green, blue, green) is registered inside the software of the camera. These intensities are then merged together to form a single pixel. The plate or film plane containing all the CCD sensors produces a color mosaic of the image being photographed.

Mosaicing and Demosaicing of Files

To produce a colored image the filtered pixel data must be run through an interpolation algorithm, which calculates the correct color for each pixel by analyzing the color of its filtered neighbors. If a pixel is white with a value of 100 percent, the probability of surrounding pixels being white is high. However, there can be a sudden change of color in an image if there are objects with sharply defined color. To help average out the colors from pixel to pixel and therefore improve the chances of an accurate calculation, digital cameras contain a special filter that blurs the image slightly, thus gently smearing the color. However, this blurring is not so great that it cannot be corrected in software (Long 2009; Young 2008). This process of interpolation is called demosaicing and is derived from the process of breaking down the chip's mosaic of RGB-filtered pixels into a full-color image. Because the camera's ability to accurately demosaic has a tremendous bearing on the overall color quality and accuracy of the camera's images, demosaicing algorithms are closely guarded secrets (Long 2009).

A final image from the digital camera consists of three separate color channels, one each for red, green and blue information. Just as in Maxwell's and Sutton's experiment, when these three channels are combined, you get a full color image. The colors are then mapped to a color working space to ensure consistency of colors. Usually this is sRGB or Adobe RGB (1998). The larger the working space, the more colors your camera can capture. Advanced DSLR cameras generally allow you to choose a working space in the menu. Or, it can be changed later in programs such as Adobe Camera Raw (Photoshop CS3 or higher), Adobe Lightroom, and Capture NX2. Also, color temperature or white balancing is processed after the image has been demosaiced. It can also be changed later in these same programs. The image is then written to a file along with an Exchangeable Image File (EXIF) that contains all relevant information including all the exposure settings of the camera as well as date and time.

File Types

The most common file types used in cameras are jpeg (Joint Photographic Experts Group), tiff (tagged image format file) and Raw files (digital negatives). Earlier digital cameras offered the choice of using jpeg or tiff files. However, there is no advantage to using tiff files within the camera since both file types are only 8 bit in the camera. Jpeg files can now have a bit depth of 24 colors while tiff files can have 32 bit color and in some cases up to 64 bit color: http://www.library.cornell.edu/preservation/tutorial/presentation/table7-1.html

Furthermore, jpegs are not meant to be used as permanent files. They are called lossy files because they are uncompressed when opening and compressed when closing and lose some quality with each event of opening the file from a hard drive. They will degrade significantly with repeated use. Jpegs saved on a CD or DVD will not lose quality as long as the disk is not re-writable. All other files types are generally lossless files.

Jpeg files can be processed rapidly within a camera and use much less memory. Tiff files slow down the processor, use a lot of memory, and produce only an 8 bit file (Young 2008). Raw files can be set to 12 or 14 bit color within the camera such as the Nikon D300. These files use

more memory than a jpeg file, but much less than a tiff file. The raw image is later processed in a separate computer program such as Adobe Camera Raw, Lightroom or Capture NX2. Once processed, the file can be converted to a 32 bit file in Photoshop or a similar program. The original raw file is not altered in the process.

Below is a summary of advantages and disadvantages of using jpeg, tiff and raw files.

JPEG Files (Joint Photographic Experts Group)

Advantages

- Jpegs are small upon compression and use little storage space.
- Most programs can process jpegs.
- Jpegs are the best format for web pages, emails, and cameras where size and speed are important.

Disadvantages

- Jpegs are generally only 8 bit files.
- They lose quality in fine detail as a result of compression upon saving and this data cannot be recovered.
- Jpegs offer less range of colors and tones.

TIFF (Tagged Image File Format)

Advantages

- Tiff files use lossless compression.
- File format is good for saving files for output, and when you need to integrate files in designs that use other software programs.
- Tiff files generally offer up to 32 bits of information.

Disadvantages

- Not as flexible as raw files.
- Tiffs are often slow in cameras and require much more memory than jpeg or raw files.
- Most cameras only offer 8-bit tiff files offering no advantage over raw files.
- Tiff files are demosaiced into three-channel color images requiring them to store three 8-bit numbers per pixel.
- Most high quality jpeg modes on most cameras are very good. You won't be able to discern the difference between the jpeg and tiff images. So, the sacrifice of extra storage space is of little value.

Raw Files (Digital Negatives)

Shooting raw files - the camera collects the data, amplifies it and writes it to a memory card along with the EXIF file. You can then take the raw file and process it in software to create a usable image. So, instead of letting the camera make computations, you move the file to a computer where you have more control of the computations and a few more settings. The demosaicing algorithms in these programs are more powerful than those of the camera and can yield a better image.

Other Advantages with Raw files and Raw Converter Programs:

- You can also choose the color working space.
- You can change the color temperature more accurately.
- The programs offer more settings for gamma, contrast and color adjustments.
- There are more controls for noise reduction and sharpening.

- Raw files can be written as 8 bit, 12 bit or 14 bit files. Jpeg files can only be written as 8 bit. Therefore there is less likely to be loss of information with raw files.
- You can save the file as raw, 8 bit jpeg or 16-32 bit tiff.
- Raw files are not altered in the programs and act like a negative.
- Raw files are much smaller than tiffs.

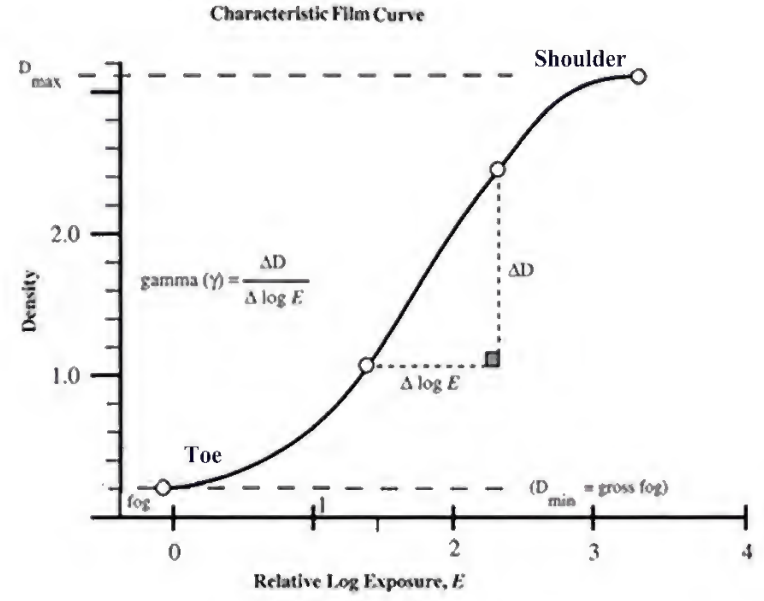
Disadvantages of Raw Files

- Raw Files are big. They can take 3 times the storage space of a jpeg.
- Special programs are needed to read and process raw files.
- Each camera manufacturer creates a profile for each model. The programs must have that profile in order to read the file.

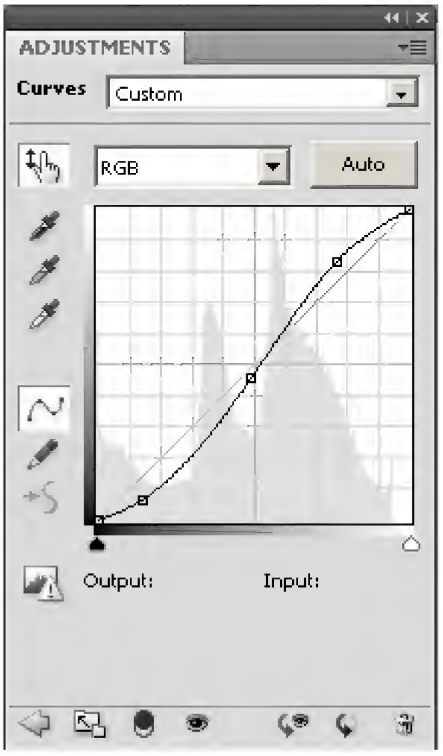
Film Curve and Gamma

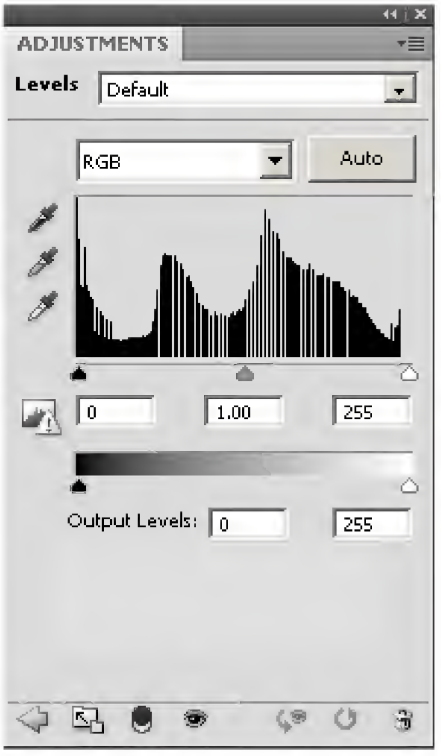
The curve and levels adjustment tools in Photoshop are related to the film curve shown below. The fog area indicates a level where not enough photons hit the film to activate a response from the silver crystals (analog). The toe includes the Dmin area where enough photons have hit the film to start to activate a response from the silver halide. However, there is little or no detail in the toe. The deep shadows in the image of Arches National Park are represented by this area. See Fig. 1.

The shoulder contains the Dmax where the silver has been saturated with photons and will no longer respond resulting in pure white areas with little or no detail. The brightest areas in the Arches image are the clouds and represent the shoulder portion of the curve. Gamma is the middle of the curve and is defined by the equation for difference in Density (delta D) divided by the difference in log of Exposure (delta log E). This is also called middle gray or mid-tones. Film and digital cameras are better at separating tones in this region. The gamma controls of levels and curves are used to control the mid-tones.



In digital cameras the silver halide crystals are replaced by CCD or CMOS sensors. Each sensor creates a voltage (analog value) that is relative to the amount of photons striking the sensor. This voltage is translated to a brightness (digital) value ranging from zero (pure black) to 255 (pure white). In Photoshop these values are represented in the Curve and Levels Tools in a manner that mimics the film curve (see below). The histogram found in both tools represents the frequency of occurrence of pixels with brightness values between zero and 255.





The curve tool (left) most closely represents the film curve. The levels tool represents frequency of occurrence of pixels for each brightness value and is similar to the exposure control of a digital camera.

Monitor Calibration

Colors can vary between devices such as the camera, the monitor and the printer. For this reason it is important to manage the monitor with color calibration and color profiles. Many digital cameras now allow the user to select a color working space such as Adobe RGB (1998) described previously. Working in the same color space in Photoshop will help standardize the colors. However, if the monitor is not calibrated this can result in differences in how the colors are interpreted relative to the camera, printer, and other devices. Mac computers come with a built in calibration tool called the Display Calibrator Assistant. Windows does not have calibration software, but the Windows versions of Photoshop include an Adobe Gamma utility. This utility used to be readily visible in the Windows Controls panel. In newer versions of Photoshop (CS3 – CS5) the user must now make a copy of the utility from the Adobe program folder to the control panel. Descriptions of how to do this can be found on the web. In Google search for "Adobe Gamma Installation CS3" and you will bring up notes from an Adobe application forum from ObjectMix.com with steps for installing Adobe Gamma. However, these programs rely on the user's eye and subjective interpretation of middle gray as well as pure red, blue and green colors. Accurate monitor calibration can be achieved by using one of several monitor calibration devices. X-rite makes a variety of calibration tools that range in capabilities and price. The Pantone

hueyPRO is the simplest device followed by the i1Display and the ColorMunki. The i1Dislplay is a good choice for most users. For calibration of the monitor and printer the ColorMunki is a great tool for graphic artists who like to print their own material. It comes with software that enables the user to create custom profiles for different papers. Otherwise, most papers have a profile that can be obtained through the manufacturer or distributor.

These color calibration tools allow the user to set the color temperature, gamma (output contrast), black and white points, and profile (see color working space) for your monitor. In all cases the listed X-rite monitor calibration tools have a default setting of 6500K for color temperature and a gamma of 2.2. The Mac has a default gamma of 1.8 but has better contrast when set to a gamma of 2.2. The Windows monitor is normally set to a gamma of 2.2 giving a flatter image. I found that my current LCD monitor has improved contrast with a gamma of 2.4. Additionally, the software places an icon in your Windows Tray or Mac Dock that allows you to change the setting based on the color profile created by the software. For information on these tools visit http://www.xrite.com. In addition to the monitor calibration tool I currently use an X-rite Passport ColorChecker to create profiles to calibrate my images and correct for minor errors in the color temperature settings of my camera. The white light settings are often not exactly perfect. However, by creating profiles for the images taken in a given environment I have more confidence in the reproduction of true natural colors on my computer screen. For a more thorough explanation of the purpose for **monitor gamma correction** see Wikipedia using the key words in bold or visit the Adobe Press URL below.
http://www.adobepress.com/articles/article.asp?p=1315593&seqNum=5

Workflow Programs

Workflow programs allow for the review of multiple images, library management, metadata management, and non-destructive editing of images. All of these programs have a least some capability for editing raw files. The most notable of these programs are Adobe Lightroom, Adobe Bridge (contains Adobe Camera Raw plug-in), Apple Aperture and Nikon Capture NX2. Capture NX2 supports only Nikon raw files. All others support raw files for nearly all cameras.

Workflow programs do the following:

- Import images
- Organize and rename files
- Add metadata
- Sort and compare imported images to find “pick” images
- Edit and pick images
- Output
- Archive

These programs generally have several components:

- Tool palettes
- Browser
- Editor
- Metadata
- Folders and file manager

Demonstration of Adobe Bridge and Adobe Camera Raw.
The power of Adobe Bridge, Adobe Camera Raw, and Nikon Capture NX2 were demonstrated at the workshop. However, it would be difficult to do justice to these programs in a newsletter. Fortunately, Adobe provides learning movies that describe the advantages of their products. To see the advantages of using Adobe Bridge go to the following website to see movies that show some of the many features of this product. We are planning to create pdf files and movies at a later time that will demonstrate the use of some of these features to create images of invertebrates.
http://tv.adobe.com/show/learn-adobe-bridge-cs5/

A fairly new plug-in program that comes with Photoshop CS2 – CS5 is Adobe Camera Raw (ACR). This tool first appeared in CS2 and was simple in design. But, it has developed into a powerful tool in CS5 that can now be used with jpeg and tiff files as well as raw files (digital negatives). And, you can convert files to an Adobe generic raw file or ".dng" file that requires less memory. In ACR you can control nearly every aspect of film editing including such items as overall exposure, color, sharpness, lens distortion, color temperature, and black and white points. In some cases you can do all of your editing and corrections before opening the image in Photoshop. Go to the URLs below for a demonstration of ACR
Adobe Camera Raw (ACR) Plug-in
http://tv.adobe.com/search/?q=adobe+camera+raw

For a demonstration of the overall power of ACR start with - GS-08: Making a Ho-Hum Raw Image Great.
http://tv.adobe.com/watch/visual-design-cs5/gs08-making-a-hohum-raw-image-great-

Non-destructive Editing with Photoshop Layers
One of the primary advantages of Photoshop is the ability to create multiple layers of edited material for a single image. These layers allow the user to make several changes to an image without committing them to a final edit. The user can therefore accept, reject or edit any layered features without having to start from scratch. The background image is locked at the start of the edit and is used for before and after comparisons with layered edits. For a demonstration of the power of non-destructing editing with layers visit the URLs below.
Using Layers in Photoshop CS5
http://tv.adobe.com/watch/peachpittv-for-designers/photoshop-studio-with-bert-monroy-lesson-on-photoshop-layers

Using Layers in Photoshop Elements
http://tv.adobe.com/watch/learn-photoshop-elements-9/working-with-layers

Capture NX2
Capture NX2 was created by Nik Software for Nikon and is designed to specifically edit Nikon raw (NEF) files. However, this program can also edit jpeg and tiff files. It is a non-destructive editor that has many of the same functions as Adobe Photoshop and Adobe Bridge. Its real power is in the use of a patented feature that creates control points. These control points allow for changes in hue, saturation, brightness, contrast, red, green, blue and warmth of an image with a single click. The masking is so seamless that zooming in on an area where the color has been altered reveals no tell tale line of pixels that are apparent even in Photoshop CS5. This is done with behind the scenes masking. For a demonstration of some features in Capture NX2 go to the URL below.
http://www.capturenx.com/en/lessons/color/index.html

Color Efex Pro and Silver Efex Pro

Color Efex Pro and Silver Efex Pro were also demonstrated at the meeting. These plug-in software products are designed by Nik Software for Photoshop, Capture NX2, Adobe Lightroom and Apple Aperture. Color Efex Pro is a set of filters that essentially eliminates the need to carry a set of lens filters while shooting. Several filters allow for the creation of dynamic effects and color correction. They offer more control of intensity of the filter and can be painted on to specific areas or applied to the entire image.

Silver Efex Pro is a black and white conversion program that adds a film grain to the image. There are a variety of films to select from, and the grain can vary from fine to coarse. Additionally, the photographer can choose one of a variety of black and white film processing and printing styles. For more information visit the URL for Nik Software: Nik Software http://www.niksoftware.com/index/usa/entry.php

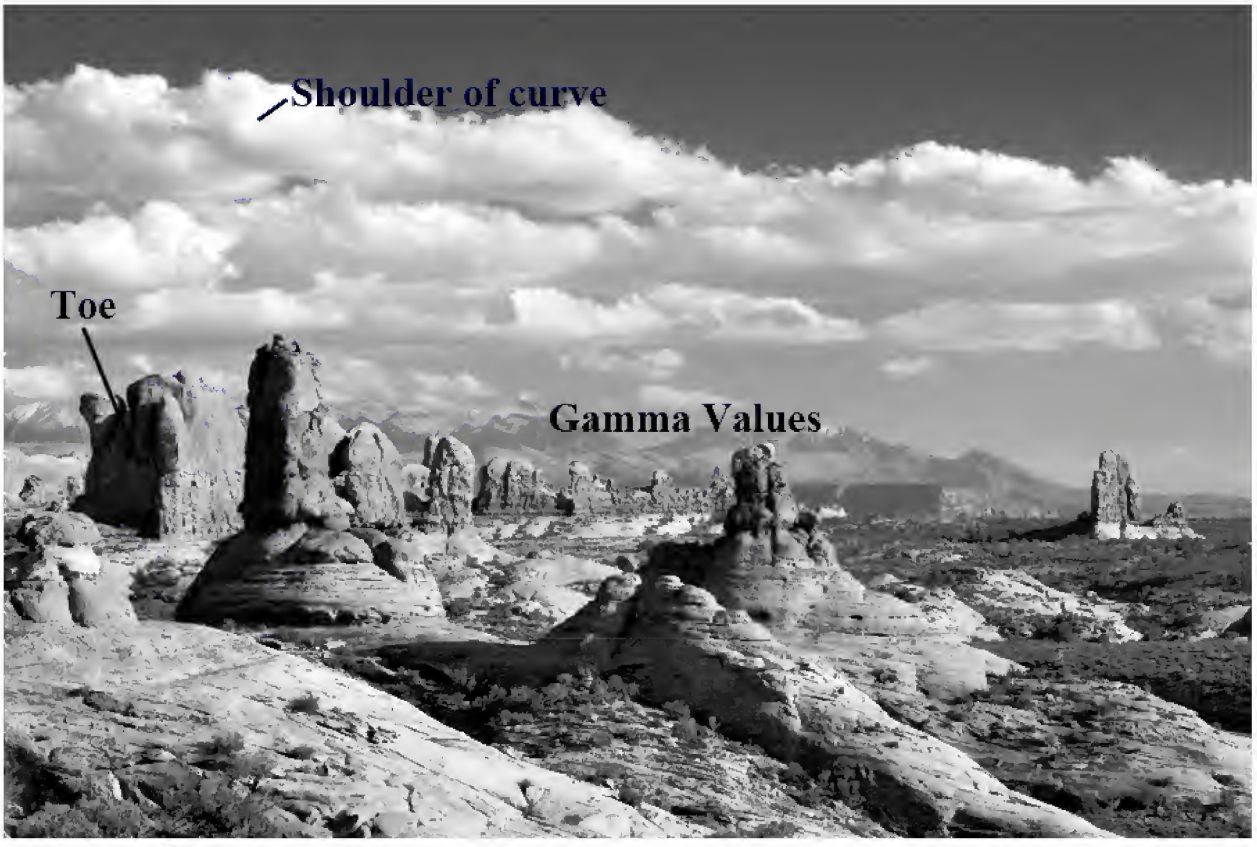


Fig. 1 - Arches National Park, October 2008. Photograph by Dan Ituarte.

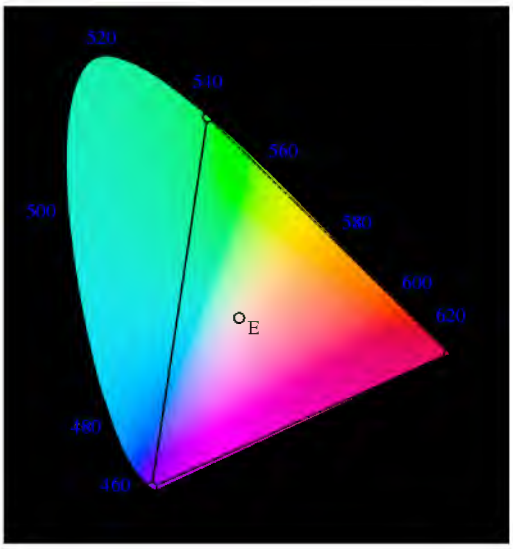


Fig. 2 - Gamut of the CIE RGB primaries and location of primaries on the CIE 1931 xy chromaticity diagram. E represents the location of the light source and is pure white (De Grandis 1986).

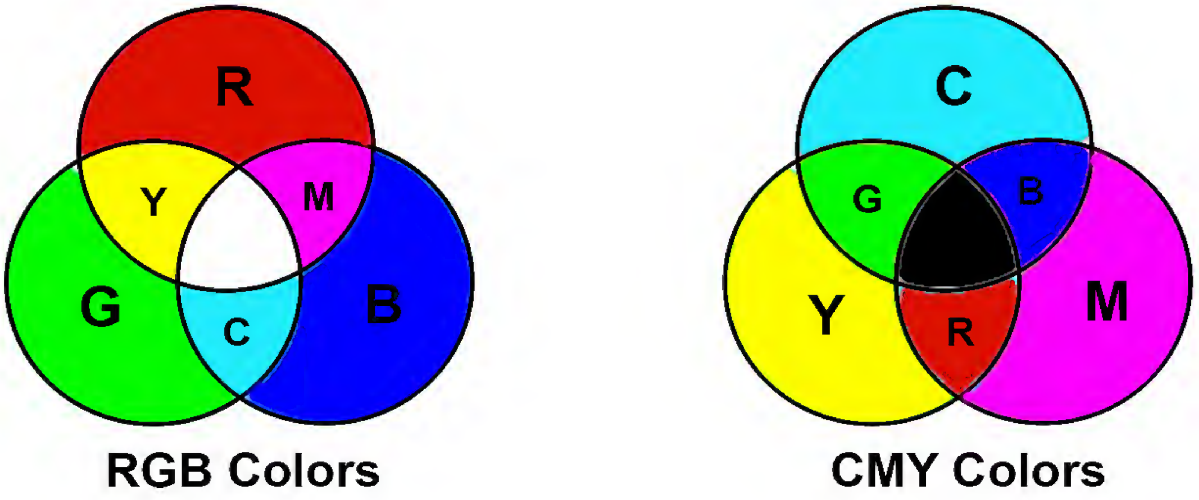


Fig. 3 - The primary colors red (R), blue (B) and green (G) added together in equal amounts produce white as shown in the center of the RGB diagram. Overlapping of RGB colors produces magenta (m), cyan (c) and yellow (y). The secondary CMY colors are subtractive from the primary RGB colors. In equal amounts CMY subtract all white light resulting in black as shown in the center of the CMY diagram. Overlap of the subtractive colors produces variations of the additive colors.

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JULY 2010

There was no meeting held in July due to it being a busy sampling month for many of the local POTW's.

2 AUGUST 2010, SCAMIT DATABASE, SCCWRP

Attendees: Larry Lovell, Kelvin Barwick, Dean Pentcheff, Karen Stocks, Don Cadien, Peter Miller, Cheryl Brantley, Ron Velarde, Wendy Enright, Ananda Ranasinghe; (remotely) Dot Norris, Deb Paul, Phil Goldstein, Katja Seltman.

The meeting was opened by Larry, he stated that the next few SCAMIT meetings will be Bight'08 QA meetings.

Kelvin announced that his Aplacophora images have been successfully submitted to Morphbank. You can now go to Morphbank and search for "Chaetoderma", for example, and you can view all the images for that taxon. The process is still under review for many members and Larry would like to have another workshop next year in the hopes of getting more images submitted.

The SCAMIT website is slowly but surely being filled with voucher sheets and newsletters. The new Google search tool is in place and it is making location of relevant tidbits in these areas, MUCH easier.

Philip Goldstein from OBIS was attending remotely. He has a great interest in our dataset, especially metadata associated with collection of the species in the list. He will interface with Shelly Moore, Katja, Deb, and Dean to set up appropriate portals.

Karen Stocks reported on the literature database project. It didn't really work out the way we had hoped. At this point it is difficult to say whether we should build on the students' efforts or start from the beginning.

Next the process of updating the Ed5 species list was discussed. Shall we do it before the database goes public or shall we use our new processes to do it? It was decided that we need to do our editing the old fashioned way so we can clean up the behind the scenes issues. It will be important to formalize how we do these emendations in order to create a framework for Katja to use in future electronic-only usage.

The following people are the proposed standing committee for final approval of species list edits: Leslie Harris, John Ljbenkov, Ron Velarde, Megan Lilly, Tony Phillips, Don Cadien, Kelvin Barwick.

Peter Miller then had the floor and spoke on uploading photos to both Morphbank and BOLD. One question that arose is how to track changes to the information after it is submitted? Can BOLD acquire data from Morphbank dynamically? Another idea is to start a list on a web-server to track what specimens SCAMIT has sampled for DNA and whether they have associated photos. One idea that was suggested was to use Google docs spreadsheet for easy on-line publishing.

Ananda spoke next and gave a BATMAN update. For the most part the p-codes are reconciled among the major players. The next step will be independent calculations to see if everyone arrives with the same number. Next up are p-codes for bays/estuaries, as well as potential geographic expansion north.

It was then requested that members be on the lookout for voucher sheets, handouts, newsletters etc that are not digitized. If you notice something missing, please scan them and send them to Dean Pentcheff: pentcheff@gmail.com

Next we addressed some issues that needed Katja's attention:
- navigation within the species – page expires; nowhere to go with family link; need author in line with primary Genus species; no hourly stamp with date stamp necessary; how is the list being sorted; issues with Morphbank search in its current format; how online updates are shown, etc.
As for access rights and privileges: Public – they can view all but no edits or revisions; Members – can submit revisions; Superusers – can accept revisions
What was evident at the end of the day is that there is still more to do…

23 AUGUST 2010, SCAMIT BIGHT '08 QA RESOLUTION, LACSD

President, Larry Lovell, opened the meeting with announcements of the upcoming meeting schedule and other items of interest to members.

The upcoming months are mainly devoted to Bight '08 QA resolution meetings between different laboratories followed by a synoptic data review meeting. There is an annual executive officers' meeting scheduled for August 28. The SCAMIT Christmas Holiday party will be held on December 4th or 11th at Cabrillo Marine Aquarium.

Larry announced the formation of a Species List Review Committee. The Committee is charged with updating the SCAMIT Species List on an annual basis. The Committee members are Don Cadien, Leslie Harris, Kelvin Barwick John Ljubenkov, Megan Lilly, Ron Velarde, Tony Phillips, and Larry Lovell. The advice of other members will be sought as necessary. The group will meet in person to organize their effort and then should be able to take care of their tasks via email thereafter.

Ananda Ranasinghe of SCCWRP was in attendance. He presented a report on the Bight '08 Benthic Committee and its next steps: There is an end of September QA deadline, which will be pushed back to allow for completion of the laboratory QA resolution meetings. Ananda will have the synoptic species list for distribution prior to the Oct 18 meeting date. He is concerned about the whole list being completely reviewed at one meeting. His providing the list ahead of time will help with that. We will likely form small groups each focused on resolving an individual major taxonomic group. Bight Benthic Committee meetings will commence again in preparation for the final report.

The Bight '08 QA resolution process to be used during the day was then reviewed and discussed by Cheryl Brantley. She commented on the inter-laboratory QA process to be used. Cheryl then reviewed the Discrepancy Resolution Reports that will be filled out by LACSD personnel. These reports will track each identification resolution event and categorize it. Results from the resolution reports will be the basis for any data change recommendations. The QA error rates will be calculated from the Discrepancy Resolution Reports.

Following Cheryl's review the taxonomists broke up into phyla driven small groups to review and resolve identification discrepancies. Prior to the meeting SCCWRP had produced a list of matching and non-matching identifications for each QA station. Each lab had received these files for review and had identified specific areas in need of resolution. With specimens available, the taxonomists paired up to reexamine specimens and resolve their differences in identification and/or specimen count.

Please visit the SCAMIT Website at: www.scamit.org

SCAMIT OFFICERS

If you need any other information concerning SCAMIT please feel free to contact any of the officers at their e-mail addresses:

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Hard copy back issues of the newsletter are available. Prices are as follows:

Volumes 1 - 4 (compilation)..... $ 30.00
Volumes 5 - 7 (compilation)..... $ 15.00
Volumes 8 - 15 ..... $ 20.00/vol.

Single back issues are also available at cost.

The SCAMIT newsletter is published every two months and is distributed freely to members in good standing. Membership is $15 for an electronic copy of the newsletter, available via the web site at www.scamit.org, and $30 to receive a printed copy via USPS. Institutional membership, which includes a mailed printed copy, is $60. All correspondences can be sent to the Secretary at the email address above or to:

SCAMIT
C/O The Natural History Museum, Invertebrate Zoology
attn: Leslie Harris
900 Exposition Boulevard
Los Angeles, California, 90007

SOUTHERN CALIFORNIA ASSOCIATION OF MARINE INVERTEBRATE TAXONOMISTS

Sept/Oct/Nov/Dec 2010 SCAMIT Newsletter Vol. 29, No. 3&4

Unidentified "*Turbonilla*"from San Diego.
Station I-33 (2), 31 Jan 05, 30m.
Image by K. Barwick.
Scale Bar equals 1 mm.

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The SCAMIT newsletter is not deemed to be a valid publication for formal taxonomic purposes.

SCAMIT YEAR IN REVIEW: May 2010 - Apr 2011

This past year, SCAMIT's 29th, was a good year for the organization. We continue to maintain our original goal of promoting the study of marine invertebrate taxonomy in Southern California and developing a regionally standardized taxonomy. We accomplish that goal in the old ways by holding monthly meetings and publishing a newsletter. We also continue to develop and improve newer computer age tools like our website, the General Discussion email list server for easy member communication, promoting Morphbank as our image repository, and development of a Taxonomic Database.

We experienced continued membership growth. We are still very much a local So Cal organization, but have members in many US states and several foreign countries. For member outreach we set up a membership table at the annual meeting of the Southern California Academy of Sciences with membership flyers, examples of newsletters, a copy of the Edition 5 Species List, beautiful color images of live marine invertebrates by Leslie Harris as eye catchers, and a laptop with the website up.

SCAMIT hosted a full compliment of meetings this past year at a variety of locations. They covered a range of topics including barcoding, digital image editing, taxonomic database development, and important new literature. There were several Bight '08 regional monitoring related meetings dealing with taxonomic QA and species list reconciliation between participating labs. Dr. Vasily Radashevsky, Vladivostok, Russia presented the results of his most recent studies on spionid polychaetes. The SCAMIT Christmas party was held at, and hosted by, the Cabrillo Marine Aquarium.

The need to maintain, revise, and release an updated SCAMIT Species List each year required the formation of a new standing committee, the Species List Review Committee. Nine local members; Don Cadien – Chair, Kelvin Barwick, Leslie Harris, Tony Phillips, John Ljubenkov, Megan Lilly, Larry Lovell, and Ron Velarde; met in January and were tasked with making changes and additions to the Edition 5 Species List in time for a July 1 release of the Edition 6 Species List. The committee will continue to revise and emend the list each year with a new version release date each July 1st. Once the Taxonomic Database is functional, computer tools will do the job of producing a revised list. Chair Don Cadien deserves a well-earned kudos for managing this effort and producing the index of the list.

SCAMIT continues to look to the future by pursuing development of the Taxonomic Database. The Taxonomic Database Committee has been slowly planning and implementing an idea developed nearly 10 years ago. Orange County Sanitation District donated funds totaling $15,000 in the past three years toward that goal. Developmental programming, databasing of the Species List, creation of a web based species page, and website upgrades have been accomplished by outside contractors using about half of those funds. We are ready to move into the next phase of development and begin adding information and tools to the structure. SCAMIT is currently in discussion with new potential partners with vested interests in the success of this project. You will be hearing more soon.

Lastly, I want address YOU, the SCAMIT members. Your continued support and interest in this organization are what make it a success. Whether you live out of the area and support us by paying your dues and participating in list server discussions, or are local and regularly attend and contribute to meetings, you are all important parts of SCAMIT's continuing success. Thank you for being part of that!!!

Sincerely,
Larry Lovell, President

SCAMIT Treasury Summary
2010 - 2011

Below is the treasurer's report for 2010-11. We are pleased that even in tough economic times memberships continue to be renewed and SCAMIT is still a bargain at $15 per year. SCAMIT did not award any publication grants this past year. As stipulated in our grant policy we have $4,638.85 (25% of our operating budget- $18,555.42 which does not include database funds), available for publication grants this year. We hosted a workshop (Morphbank with Deb Paul) and visiting lecturer (Joshua Mackie – Oligochaetes) this past year. Your dues directly help to fund these activities. SCAMIT also hosted another holiday party in December for all its members at the Cabrillo Marine Aquarium and we hope to again this year. Also, we have maintained our all time high for memberships (150). Every year we get a few new members and while a few people retire we still seem to attract more than we lose. A trend we hope continues!

Account Balances (as of 6/15/11)

	Checking	**$ 5,398.76**
	Certificate of Deposit	**$13,141.66**
	Cash	**$ 15.00**
	Database Fund	**$ 7,558.30**
Total		**$ 26,113.72**

Income

	2011 Membership dues	$ 2084.00
	Interest from CD	$ 34.33
Total		**$ 2118.33**

Expenses (General Account)

Electronic newsletter (website/domain name)	$ 29.97
Hardcopy newsletter (printing/postage)	$ 338.02
Workshop/meeting expenses	$ 177.19
Holiday party/Meeting refreshments	$ 263.19
Travel Stipends	$ 653.29
Total	**$ 1461.66**

Expenses (Database Account)

Morphbank workshop	$ 695.00
Travel Stipend for Deb Paul	
Website Design/Improvements	$1335.00
Total	**$2030.00**

13 SEPTEMBER 2010, LACSD, B'08 QA/QC

Attendance: Larry Lovell, LACSD; Bill Power, LACSD; Bill Furlong, LACSD; Jim Roney, CLAEMD; Chase McDonald, LACSD; Cheryl Brantley, LACSD; Don Cadien, LACSD; Kelvin Barwick, OCSD; Tony Phillips, CLAEMD; Dean Pasko, OCSD; Megan Lilly, CSD.

Larry Lovell opened the meeting with the usual business announcements. Upcoming meetings were the first order of business. 18 October will be at SCCWRP and will be a synoptic review of the B'08 species list. 8 November will have malacologists at OCSD for a review of Molluscan literature that might impact the next edition of the SCAMIT species list. The meeting will be lead by Kelvin Barwick.

It was then mentioned that a future hopeful meeting would be another Morphbank image submittal workshop with Deb Paul. It will be asked that participants each bring 10 images to practice submitting via the spread sheet method. Speaking of morphbank, Don Cadien and Kelvin Barwick's aplacophoran images have been submitted and are now up and available for public viewing on morphbank.

The idea of public viewing lead to the announcement that **all** issues of the SCAMIT newsletter are now up on the SCAMIT website and can be searched. So, if you are looking for information on a specific species, you can now seach the newsletters with that species name to see if it was ever discussed and reported on by SCAMIT.

UPCOMING MEETINGS

17 October 2011. 9:30–3:30. Enopla Bight '08 specialty taxonomy presentation at Orange County Sanitation Districts. Meeting Lead - Tony Phillips.

14 November 2011. 9:30–3:30. Syllidae Bight '08 specialty taxonomy presentation at the NHMLAC in the education room. Meeting Lead - Ron Velarde.

10 December 2011. 5:00-9:00 PM. SCAMIT Holiday Party at Cabrillo Marine Aquarium. SCAITE members are invited to join us. Additional details to be provided via email.

12 December 2011. 9:30-3:30. Paraonidae seminar at NHMLAC. Meeting lead visiting scientist Michael Reuscher, TAMUCC.

9 January 2012. 9:30-3:30. "Vertebrate and Invertebrate collecting and diving adventures in the Pacific Northwest" at Cabrillo Marine Aquarium with author Andy Lamb, formerly at the Vancouver Aquarium. Trawl QA protocols discussion. Joint SCAMIT and SCAITE meeting.

13 February 2012. 9:30–3:30. SCB isopod review at the City of San Diego. Meeting Lead - Dr. Tim Stebbins.

Speaking of the SCAMIT website... it was asked that as members identify their samples, they check to see if the taxonomic information they are using (voucher sheets, in-house keys, etc) are up on the SCAMIT website in the Taxonomic Tools Box. This feature of the website has changed dramatically and much has been added to it, but it could always use more input and updating.

After that Ananda had the floor and discussed the upcoming B'08 synoptic species list review. He will distribute the completed list prior to the upcoming 18 October meeting. He has some concerns about the feasibility of reconciling the entire list at one meeting which is why he is working on distributing the list early, giving us a chance to do some prior review work. After the synoptic list review meeting, the Bight Benthic Committee will commence meeting again in prepartion for the final report. These will not be SCAMIT meetings.

Cheryl Brantley then had the floor to comment on the B'08 QA process and discuss how the Discrepancy Resolution reports were to be filled out by LACSD personnel.

The next topic was the newly formed Species List Review committee. The committee members will be Don Cadien, Leslie Harris, Kelvin Barwick, John Ljubenkov, Megan Lilly, Ron Velarde, Tony Phillips, and Larry Lovell. Others will be sought for their opinion as necessary. Dean asked if we were committed to the dynamic species list. It was explained that this has been discussed in depth at the taxonomic database meetings. The plan is to have at least two defined points in time (Jan 1 and July 1) as benchmark species lists for use by POTW's and consulting labs, to define versions of the species list. A specific listing of changes to the list over all, and for each new version, should also be available. A dated version of the list will be accessible for any calendar date should it be desired. The Species List Review committee will review proposed changes and approve, hold, or deny them several times a year (2-4). They will be in contact with one another via an email list server and consult other members when appropriate.

The remainder of the day was spent reviewing B'08 QC samples. Discrepancies (Ids and counts) in data were resolved between the primary taxonomists of CLAEMD and ABC Labs, and LACSD secondary QA taxonomists.

4 OCTOBER 2010, CSD, B'08 QA/QC

Attendance: Megan Lilly, CSD; Don Cadien, LACSD; Ron Velarde, CSD; Larry Lovell, LACSD; Bill Furlong, LACSD; Cheryl Brantley, LACSD; Veronica Rodriguez, CSD; Ricardo Martinez, CSD; John Byrne, CSD; Bill Power, LACSD; Wendy Enright, CSD; Kathy Langan, CSD.

Larry opened the day by announcing upcoming meetings and reminded members of the annual SCAMIT Christmas party on 11 December 2010 at the Cabrillo Marine Aquarium. The party is from 5:30 to 9:00. SCAMIT will provide the main course, but people are encouraged to bring side-dishes to share pot-luck style. This year SCAMIT has invited members from two sister organizations to join us – both SAFIT and SCAITE members are welcome to come participate in our celebration.

There was then some discussion as to possible meetings next year. One suggestion was another Morphbank image submittal workshop.

Don Cadien then had the floor and wanted to tell everyone about a recent Amphipod publication: **Genetic diversity in two introduced biofouling amphipods (*Ampithoe valida* & *Jassa marmorata*) along the Pacific North American coast: investigation into molecular identification and cryptic diversity by Erik M. Pilgrim, and John A. Darling. 2010**.

With that the business portion of the meeting was adjourned and attendees separated into pairs to review the results of the re-identification process with one another.

15 NOVEMBER 2010, MOLLUSCAN LITERATURE REVIEW/PYRAMIDELLIDAE DISCUSSION, OCSD

Attendance: Wendy Enright, CSD; Bill Power, LACSD; John Ljubenkov, DCRE; Bob Dees, SDSC; Ron Velarde, CSD; Don Cadien, LACSD; Kelvin Barwick, OCSD; Larry Lovell, LACSD; Mike McCarthy, OCSD; Jules Hertz, SDSC; Carole Hertz, SDSC; Pat LaFollette, LACM; Scott Rugh, Invertebrate Paleo.

The day began with upcoming meeting announcements. 22 November Vasily Radashevsky will present on his work with spionid polychaetes at LACMNH. All are invited to bring problematic Spionidae for identification and to donate extra specimens for the natural history museum in Vladivostok, Russia. Friday, 10 December, will be a crustacean literature meeting at LACSD. Don Cadien will lead a review of new crustacean literature that affects Ed 5 name usage. Mary

Wicksten will be attending the meeting and sharing her work on SCB shrimp and other Decapoda. 11 December will be the SCAMIT Xmas party at Cabrillo Marine Aquarium.The gift shop will be open 5:30-6:30 and will be offering a 20% discount for attendees. Please come and enjoy the festivities.
Non-SCAMIT meetings: 1 December will be a B'08 benthic committee meeting followed by BATMAN working group at SCCWRP. 22 January will be the Southern California Unified Malacologists (SCUM) meeting hosted by K Barwick at SCCWRP 9-3:30 (this meeting was postponed and was eventually held on 5 March). The Western Society of Malacologists will hold a joint meeting with the Mexican Malacological Society from the 27-30 June (2011) in La Paz, Mexico.The official meeting announcement is forthcoming.
We discussed other upcoming meetings that so far are without hosts or dates – further literature review meetings for the echinoderms and miscellaneous phyla, plus Bight '08 review meetings: Cnidarians with John Ljubenkov, Enoplans with Tony Phillips, and Syllids with Ron Velarde.

Larry Lovell demonstrated the nascent capabilities of the online taxonomic database currently under development with the assistance of Katja Seltmann. There are many bugs in the system still to be worked out including improved higher level taxonomic filtering, connection with Morphbank, and formatting of the information shown on the species pages. However, progress is being made and efforts to link collection data, expected habitat type, and other elements of the taxonomic toolbox are ongoing.

Kelvin then took the floor and gave a PowerPoint® presentation of some of the relevant changes to the molluscan fauna published in the literature over the last few years. Thanks to Don Cadien for compiling the list. Highlights of his presentation included papers describing new nudibranch species and synonymizing others, as well as a paper revising the Pandoridae by Paul Valentich-Scott and Carol Skoglund. Also reviewed was an extensive revision of Euheterodont higher level classification based on molecular work and a revision of the North Pacific *Solemya* species by Kamenev. The next edition of the SCAMIT taxonomic listing will incorporate many of the taxa changes expressed in these and other publications. An abbreviated version of Kelvin's presentation can be found at the end of this newsletter. A full version will be posted on the SCAMIT website in the Toolbox. A complete bibliography, including other recent papers not reviewed at the meeting, can also be found at the end of this newsletter. Many of these publications were made available as PDF files at the meeting.

Finally, we tackled the lamentable state of the Pyramidellidae. Don was especially morose at the prospect of trying to assign proper names to this family that has significant errors going all the way back to the 1800's. However, in an attempt to clarify the situation, he has created useful files and tables dealing with the groups' taxonomic issues. These files are included as part of this newsletter.
For the hands on portion of the meeting we were fortunate to have Pat LaFollette from LACMNH, one of the leading experts on the family, on hand to help us deal with the mess. He also brought an extensive collection of pdf files representing the most useful pyramidellid literature available. Much thoughtful discussion ensued including the final realization that although the family has been over-split, there still remain many new species not yet described. Pat's suggestion for us is to take high quality, detailed photographs of our *Turbonilla*, *Pyrgiscus*, and *Odostomia* species (don't forget your scale bars, locality, and depth information!) and share them with him and with each other. If it is possible to assign it unequivocally to a described species, he will aid us in giving specimens names but otherwise he believes it best to continue with our extensive use of provisionals. Also, he suggested we use Abbott 1974 as a primary

resource and elevate the subgenera used therein to full generic status. As a final note, he reminded us that a *Turbonilla*-type shell that has spiral sculpture is actually a *Pyrgiscus* (in the broad sense). Therefore, our *Turbonilla* sp A is actually *Pyrgiscus* sp A.

At the end of the day, Pat sat down at the scope and looked at a few voucher specimens brought in by Carol Paquette and the City of San Diego. He was able to give names to two specimens; *Turbonilla* sp SD7 is now *Pyrgiscus signae* and *Turbonilla* sp SD1 (which appears to be the same as a white form Carol had with her) is *Turbonilla santarosana*. Pat was not able to give a name to SCAMIT's *Turbonilla* sp A but encouraged us all to start taking photos and sharing them around in the hopes of putting a couple more names out there.

Below is a "quick check" to be used when looking at Pyramidellids:

"Odostomids"
Odostomia – smooth, white
Chrysallida – axial and spiral sculpture forming nodules
Ividella – lamellar axial and spiral sculpture

"Turbonillas"
Pyrgiscus – axial and spiral sculpture
Turbonilla – axial sculpture only

The systematics of NEP pyramidellids
- by D. Cadien

As we attempt to reach a concensus position regarding how SCAMIT members might be aligned in their usage of pyramidellid nomenclature there are a number of factors to consider.
Perhaps central is the result of molecularly based phylogenetic study of the group. Schander et al (2003) examined a number of representatives of the subfamilies Odostomiinae and Turbonillinae with interesting results. Perhaps the most surprising was the placement of members of the ostensibly "turbonilline" subgenus or genus *Pyrgiscus* among the odostomines rather than within the Turbonillinae (although the authors retained them within the turbonillines pending further investigatioin). There has always seemed to be a slippery slope of "how tall vs how broad" which should clearly separate Odostomiinae and Turbonillinae, but does not. Other recent examinations of groups on the basis of morphology, particularly refined nuclear morphology, has resulted in numerous other realignments within the family. In a few cases groups of species have been suggested to lie outside the pyramidellid fold entirely, requiring new familial placement. Schander, Aartsen and Corgan (1999) suggest that the recognized subfamilies of the Pyramidellidae be elevated to full family status, a controversial and as yet unadopted proposal. Much of this activity has been in Europe and concerns genera and species groups not occurring in the North American fauna.

Next is the extensive overapplication of a typological concept of species by Dall and Bartsch (inter alia), which has led to a very large number of named forms, many suspected of being or proven synonyms (see table of NEP taxa). As investigations of variation within populations of a given taxon have become available (i.e. LaFollette 1979, Porter 1976, Porter et al 1980) variability in shell sculptural detail has been shown to be greater than one might like. Since a very large proportion of the species are known only from dead shells, the information base does not yet provide the ability to use non-shell characters in taxonomic decision making. McLean has long argued (but see Schander and Sundberg 2001 for a dissenting viewpoint) that shell structure must be the predominant and preferrably the only information source for the group. Preliminary soft

tissue approaches (see for instance Wise 1996, Schander, Hori and Lundberg 1999) have proven promising, but too few species anatomies have been investigated to date. This fact along with the demonstrated variability of some species shell morphology has lead to an uncertain position where many shell-based taxonomic judgments are questionable. There are also suggestions that cryptic speciation many be hidden by virtually identical shell form. Host-parasite investigations by Collin and Wise (1997) show that ontogenic host switching suggested for *Odostomia columbiana* could not be experimentally induced, and that cryptic speciation is suggested by the reported occurrence of this animal on different hosts. Work is ongoing to resolve these issues, but progress is slow, and mostly generated in other faunas. Pat Lafollette has worked on the local fauna for decades, and is slowly progressing towards resolution and further publication. Once the new regional handbooks for the temperate and boreal NEP gastropods are published (McLean mss.) many issues will be resolved. In the interim we move slowly towards an expanded consensus on the local fauna.

With such consensus in mind I have made recommended usages for all of the species listed in the NEP taxa table. Where recent publications provide direct input, this has been cited. In cases where the species in question has not been directly addressed in recent literature, I have extrapolated from that literature, and from other sources to suggest the most likely valid placement for the species. In cases such as *Chrysallida*, where the boundaries between that genus and the genera *Boonea* and *Fargoa* (see discussion in Pimenta, Absalão & Miyaji 2009) need further resolution, these recommendations will probably be extensively revised in future (and are already probably contraindicated by the McLean manuscript placements).

In others, such as most of the turbonillids, the majority of species cannot yet be defensibly seated in an appropriate genus. All species previously allocated to *Mormula*, *Chemnitzia*, *Turbonilla*, *Pyrgisculus*, *Pyrgolampros*, and *Strioturbonilla* are being left at *Turbonilla* s.l. pending further information. The extensive work undertaken in European seas in recent years (Aartsen 1977, 1981, 1984, 1987, 1988, 1994; Aartsen and Corgan 1996; Aartsen and Menkhorst 1996;Aartsen et al 1998; Linden and Eichenboom 1992; Penas and Rolán 1997a & b, 1998, 1999; Penas et al 1996; Schander 1994, 1997; Schander, Hori & Lundberg 1999; Schander, Aartsen & Corgan 1999) has begun to show that application of generic names generated for European taxa may not be appropriate to the West Coast fauna. Consequently transferrals of species to other genera will continue. In the sense that Dall and Bartsch (1904) provided a plethora of new genera, these names may already exist, and merely need to be recognized as now valid for animals previously interpreted as members of genera known from European or other waters. This is also true, in a more limited sense and at the species level, of the east coast of South America, where recent work (Pimenta and Absalão 2001a,b; 2004a,b; Pimenta, Absalão and Miyaji 2009; and Pimenta, Santos and Absalão 2008) have shown less amphiatlantic and more endemic distributions than previously reported.

There is, however, always the issue of introduction of exotic species. We currently know of one Atlantic pyramidellid established in the NEP, *Odetta bisuturalis* (Say 1812). It is currently known only from San Francisco Bay (McLean 2007), but may eventually escape and occur elsewhere on the West Coast. The frequency of reports of exotic pyramidellids in the Mediterranean (Zibrowius 1991, Meinis 2004, Aartsen and Hori 2006, Ozturk and Aartsen 2006) suggests that such events may be locally underreported, and that *O. bisuturalis* is not alone as an introduced species. Given the incompleteness and general disarray of our local species level taxonomy for the group, recognition of such introductions is particularly difficult here in California.

The primary descriptive work on NEP pyramidellids is fairly concentrated. Over an early base laid down by C. B. Adams and P.P. Carpenter, most was done by Dall and Bartsch, and summarized in their monographic review of 1909. Additions of new species continued after this as well (Bartsch 1910, 1912a & b, 1917, 1921, 1927,1937; Smith and Gordon 1948; and Willett 1929). To the south this was augmented by other contributors working in the Panamic fauna (Baker, Hanna & Strong 1928, Strong 1949). Collectively this has resulted in a large mass of described forms, with a number of published, and probably additional unrecognized, synonyms. Resolution of these will, in many cases, depend on critical reexamination of types, a process facilitated by reviews of the works of major contributors (Boss et al 1968, Johnson 1964, Palmer 1958, and Ruhoff 1973). Even with these aids, the material on which some species have been based is poor, particularly when based on beach collected dead shells, as was often the case for Adams, Gould and Carpenter species. Critical examination of these types may prove that some forms are not recognizable, and should be treated as nomena dubia

While we currently struggle under a mass of unneeded synonyms, there are perhaps still many undetected and unnamed new species in local waters. Some of the currently used SCAMIT or agency provisional names may be among these, but these probably reflect uncertainty as to which of the described forms correspondes to the specimens at hand. As the parasitic biology of pyramidellids becomes clearer (Fretter and Graham 1949, Robertson and Orr 1961, Ankel and Christensen 1963, Bullock and Boss 1971) we can recognize that in at least some cases the animals are highly specific to a given food organism (see discussion of Collin and Wise 1997 above). As the diversity of West Coast macrofaunal assemblages is quite high compared to many other regions, we may expect a number of cryptic prey-specific species to be present. All in all a daunting series of problems and complications, but not an insurmountable one. If we can at least achieve greater standardization of name application in our monitoring, we can begin to accumulate the type of ecological information which will lead to more complete understanding of these organisms – a prerequisite to a better understanding of their taxonomy.

List of Pyramidellid genera applicable to West Coast Taxa (bolded taxa indicate recent use in regional publications) – D. Cadien

ODOSTOMIAS

Aartsenia Waren 1991 (replacement name for Amaura Møller 1842, preoccupied seeTurgeon et al 1998)

Besla Dall and Bartsch 1904

Boonea Robertson 1978 – see comments under Chrysallida

Brachystomia Monterosato 1885

Chrysallida Carpenter 1856 (distinctions between this genus and *Boonea* need further exploration, and some taxa assigned here may ultimately be removed to *Boonea* or to *Fargoa*)

Egila Dall and Bartsch 1904

Eulimella Forbes & MacAndrew 1846 (includes taxa assigned to *Ptycheulimella* Sacco 1892, which, according to Aartsen et al 1998 is not well enough defined for recognition

Eulimastoma Bartsch 1916 (pyramidellid species previously assigned to *Scalenostoma* Deshayes 1863 are removed to this genus since *Scalenostoma* has proven to be a eulimid (Warén 1980)

Evalea A. Adams 1860

Evalina Dall and Bartsch 1904

Haldra Dall and Bartsch 1904

Heida Dall and Bartsch 1904

Iolaea A. Adams 1867

Ivara Dall and Bartsch 1903
Ividella Dall and bartsch 1909
Ividia Dall and Bartsch 1904 (replacement name for American species of *Miralda* not conspecific with the type of the genus per Ode 1993, but a junior synonym of *Liamorpha* Pilsbry 1898 according to Aartsen et al 1998)
Liamorpha Pilsbry 1898 –see comments under Ividia
Menestho Møller 1842
Odetta de Folin 1870
Odostomia Fleming 1813
Oscilla A. Adams 1861 [added per P. Lafollette]
Salassia de Folin 1870
Salassiella Dall and Bartsch 1909
Trabecula Monterosato 1884

TURBONILLAS
Bartschella Iredale 1917
Careliopsis Mörch 1875
Chemnitzia Orbigny 1839
Mormula A. Adams 1864
Pyrgiscus Philippi 1841
Pyrgolampros Sacco 1892
Strioturbonilla Sacco 1892
Turbonilla Risso 1826

OTHER PYRAMIDELLIDS
Longchaeus Mörch 1875
Pyramidella Lamarck 1799
Peristichia Dall 1889

Diagnoses of genera of potential use for West Coast species (drawn from the literature) - D. Cadien

Aartsenia Warén 1991
Very large, usually inflated Odostomias, the sculpture of which consists of very fine lines of growth and still finer wavy closely placed spiral striations." (Dall and Bartsch 1909 – for Amaura).

Besla Dall and Bartsch 1904
"Small odostomias with axial ribs and three strong spiral raised threads, one at and two posterior to the periphery between the sutures; based marked by raised spiral threads." (Dall and Bartsch 1909).

Boonea Robertson 1978
"Shell thick, chalky white, conical, 3-5mm in length, with 4-5 adult whorls. Whorls with or without spiral cords, axial ribs or both. Body whorl 50% of shell length. Umbilicus minute or absent. Protoconch smooth, sinistrally heterostrophic oriented 120º-130º to teloconch, partially submerged in first adult whorl. Aperture auriform, with single acute columellar fold. Operculum tan or brown, auriform, paucispiral, with subcentric nucleus." (Wise 1996).

Brachystomia Monterosato 1885
"Bocca corta, labbro non dentato, conchiglie piccole, levigate, rissoiformi o turricolate. Un piccolo dente alla columella." [Aperture short, lip non-denticulate, shell small, smooth, rissoiform or turriculate. Small tooth on the columella. Translation courtesy of Pat Lafollette] (Monterosato 1885).

Chrysallida Carpenter 1856
"Odostomias having strong axial ribs crossed by equally strong spiral keels between the sutures, the intersection of these to elements forming nodules. The axial ribs pass only faintly over the base, while the spiral sculpture remains quite prominent." (Dall and Bartsch 1909).

Egila Dall and Bartsch 1904
"Odostomias with the axial ribs extending from the summit of the whorls to the umbilical region; periphery with a deep sulcus bounded on each side by a tumid area; the base is spirally striated." (Dall and Bartsch 1909).

Eulimella Forbes & MacAndrew 1846
"Elongate-conic, surface polished, with faint growth lines and microscopic spiral striations; base without a fasciole; columella with 2 folds." (Abbott 1974).

Eulimastoma Bartsch 1916
"2-5mm., high-spired, with a single columellar plication. Base of whorl with angulation or keep. 2 nuclear whorls, almost planorboid, partially immersed. Without axial sculpture. With or without a small umbilicus." (Abbott 1974).

Evalea A. Adams 1860
"Odostomias having the surface marked by fine incised spiral lines." (Dall and Bartsch 1909).

Evalina Dall and Bartsch 1904
"Odostomias having feebly developed axial ribs which are usually only indicated near the summit of the whorls; spiral sculpture consisting of many finer lirations; summit of the whorls not tabulated." (Dall and Bartsch 1909).

Haldra Dall and Bartsch 1904
"Odostomias with more or less irregular, acute axial ribs extending from the summits of the whorls to the umbilical region, crossed by subequally spaced acute spiral ridges between the sutures and on the base. The intersections of the ribs and spiral ridges are thickened, but scarcely nodulose, ending the shell a very rough appearance." (Dall and Bartsch 1909).

Heida Dall and Bartsch 1904
"Shell without axial or spiral sculpture beyond mere lines of growth and exceedingly fine spiral striations; peritreme continuous, aperture rissoid." (Dall and Bartsch 1909).

Iolaea A. Adams 1867
"Shell umbilicated, marked by spiral cords, and axial riblets which cross the grooves between them." (Dall and Bartsch 1909).

Ivara Dall and Bartsch 1903
"Odostomias having feebly developed axial ribs which are usually only indicated near the summits of the whorls; spiral sculpture consisting of many subequally spaced fine lirations; summits of the whorls strongly tabulated." (Dall and Bartsch 1909).

Ividella Dall and Bartsch 1909
"Odostomias marked with lamellar spiral ridges and equally strong lamellar axial ribs, both of which ornament spire and base." (Dall and Bartsch 1909).

Liamorpha Pilsbry 1898
"Odostomias with very strong spiral keels between the sutures and on the base. Upper keels usually nodulated." (Abbott 1974 for Miralda).

Menestho Møller 1842
"Shell not umbilicated, marked by moderately well developed and usually equally spaced spiral cords; axial sculpture reduced to mere lines of growth which frequently appear as very slender raised threads in the grooves between the cords." (Dall and Bartsch 1909).

Odetta de Folin 1870

Odostomia Fleming 1813
"Shell white or yellowish, short, conical, 3-5mm in length, with 4-6 adult whorls. Whorls smooth to cancellate. Body whorl 50-60% of shell length. Umbilicus small or absent. Protoconch smooth, dextrally or sinistrally heterostrophic oriented 120º-150º to teleoconch, partially submerged in first adult whorl. Aperture ovate, with single acute columella fold. Operculum brown, ovate, paucispiral, with subcentral nucleus." (Wise 1996).

Oscilla A. Adams

Salassia de Folin 1870
"Shell pupiform, whorls not inflated, marked by axial ribs which extend from the tabulated summit of the whorl to the umbilical area. Varices absent" (Dall and Bartsch 1909).

Salassiella Dall and Bartsch 1909
"Shell pupiform, whorls inflated, marked by axial ribs which extend undiminished from the summit to the umbilical area. Varices strong, irregularly distributed" (Dall and Bartsch 1909).

Trabecula Monterosato 1884
"Spiral markings consisting of several to many raised threads in the intercostal spaces, always less strongly developed than the axial ribs. Intercostal spaces crossed by equally spaced, raised spiral threads, sculpture reticulated" (Dall and Bartsch 1909).

<u>TURBONILLAS</u>
Bartschella Iredale 1917
"Turbonillas with well-rounded whorls, marked with strong axial ribs and strong spiral cords, the junction of which are usually subnodulose." (Abbott 1974).

Careliopsis Mörch 1875
"Shell minute, slender, thin, white, with very fine reticulated sculpturing." (Abbott 1974).

Chemnitzia Orbigny 1839
"Turbonillas without spiral sculpturing, having prominent axial ribs which fuse or terminate at the periphery. Intercostal areas sunken. Base smooth." (Abbott 1974).

Mormula A. Adams 1864
"Turbonillas having axial ribs and deeply incised spiral lines; also irregularly disposed varices on the outer surface, which usually mark internal lirations on the outer lip, or internal lirations of the outer lip only. Sculpture never nodulose." (Dall and Bartsch 1909).

Pyrgiscus Philippi 1841
"Turbonillas having strong spiral incised grooves as well as axial ribs. Summits of the whorls not strongly shouldered." (Abbott 1974).

Pyrgolampros Sacco 1892
"Turbonillas with low, broad, rounded vertical ribs which almost always disappear as they pass over the periphery and base of the last whorl, and many very fine, faint, wavy spiral striations; surface covered by a thin epidermis. Columella usually somewhat flexuose." (Dall and Bartsch 1909).

Strioturbonilla Sacco 1892
"Ribbed turbonillas with finely and closely packed spiral striations on the spire and base. " (Abbott 1974).

Turbonilla Risso 1826
"Shell white and lanceolate, 9mm in length, with 10-12 adult whorls. Whorls slightly convex to straight. Each whorl with prominent axial ribs, extending whorl length, except on body whorl, where axial ribs terminate prior to base. Intervening spaces present between ribs. Body whorl 20% of shell length. Umbilicus absent. Protoconch smooth, sinistrally heterostrophic, perpendicular to teleoconch, partially submerged in first adult whorl. Aperture squarish, with straight outer lip and slightly flared base. Columellar folds absent. Operculum tan, lenticular, with subcentric nucleus." (Wise 1996).

OTHER PYRAMIDELLIDS
Longchaeus Mörch 1875
"Shell elongate-conic, not umbilicated, having three columellar folds, a basal fasciole and peripheral sulcus. The entire surface is marked by fine lines of growth and microscopic spiral striations." (Dall and Bartsch 1909).

Pyramidella Lamarck 1799
"Shell of many whorls, turrited, umbilicated; columella with three folds; outer lip usually reenforced within, at irregular intervals, by spiral lamellar thickenings. The sculpture consists of mere lines of growth and very fine spiral striations." (Dall and Bartsch 1909).

Peristichia Dall 1889
"Shell elongate, small, white, spirally corded, similar to Triptychus, but with only 1 basal spiral cord (instead of 2) and lacking columella folds." (Abbott 1974).

22 NOVEMBER 2010, SPIONIDAE, NHMLAC

Attendance: Kathy Langan, CSD; Veronica Rodriguez, CSD; Ron Velarde, CSD; Tony Phillips, CLAEMD; Kelvin Barwick, OCSD; Larry Lovell, LACSD; Leslie Harris, LACM; Vasily Radashevsky, IMB RAS.
The meeting opened with President Larry Lovell making a few brief announcements: There will be a Crustacean literature meeting Friday, Dec 10, at LACSD from 9:30-3:30. Don Cadien will lead a review of new crustacean literature that affects Ed 5 name usage. Mary Wicksten will be attending the meeting and sharing her work on SCB shrimp and other Decapoda.

After the opening announcements Vice-President Leslie Harris had the floor and introduced guest speaker Dr. Vasily Radachevsky, polychaete researcher at the Zhirmunsky Institute of Marine Biology, Russian Academy of Sciences, Vladivostok, Russia. Leslie and Vasily had just returned from a PICES meeting on invasive species in Portland, Oregon. Leslie will report on the conference and associated collecting activities in a future newsletter. It was a wonderful conference and Leslie provided information to the attendees on the taxonomic work done by SCAMIT and its members. On their return to Los Angeles many intertidal collecting stops were made looking for spionids and other polychaetes of interest along the coastline.

Vasily then began a discussion on his recent work on Eastern Pacific Spionidae with updates to local species names and reports of non-indigenous species. He gave a Powerpoint presentation with beautiful color images of live worms and collecting localities. There were species pages that presented both historical and new information. Species within the genera *Polydora*, *Pygospio*, *Boccardiella*, *Dipolydora*, *Boccardia*, and *Rhynchospio* were discussed. Vasily will publish updates and corrections to species descriptions, distributions, character states, and correct name usage on several species in these genera very soon.

He also reported on his participation at a recent polychaete taxonomic workshop in Bath, England. He was invited to attend and give a talk on the family Spionidae. He presented a "Key to genera of Spionidae recorded from or likely to be found in shallow waters around Britain and Ireland". Of course many of those genera are found off our coast, but not necessarily the same species. Three genera we don't report on the west coast that showed up in the key were *Atherospio*, (closely related to *Pseudatherospio*), *Laubieriellus*, and *Aurospio*, both closely related to *Prionospio*.

Vasily then was able to spend time looking at a few specimens of interest that members brought to share or about which they had questions. He reiterated his desire to receive spionid specimens from any location for deposit into his Institute's polychaete collection. Complete specimens in good condition are of course preferred.

10 DECEMBER 2010, LACSD, CRUSTACEA LITERATURE REVIEW

A report from this meeting is still pending and will be provided in a future issue. However, the bibliographies distributed that day are at the end of this newsletter.

Please visit the SCAMIT Website at: www.scamit.org

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A bibliography of some of the relevant Mollusk literature published since 2008. Compiled by Don Cadien and Kelvin Barwick (last revised 1NOV2010)

Behrens, D. W., M. T. Gosliner, et al. (2009). "A New Species of Dorid Nudibranch (Mollusca) from the Revillagigedo Islands of the Mexican Pacific." Proceedings of the California Academy of Sciences **60**(11): 423-429.

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Phylogeny and Evolution of the Mollusca
by Ponder and Lindberg

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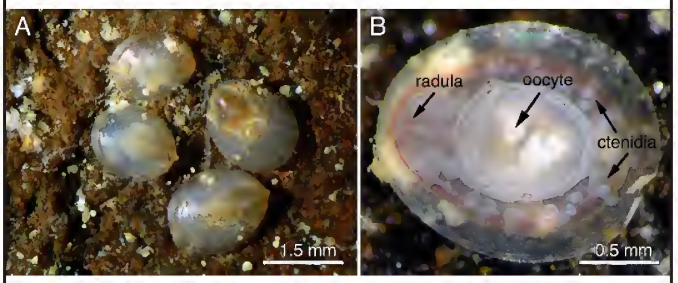
SCAMIT Mollusk Literature Review
November 15, 2010

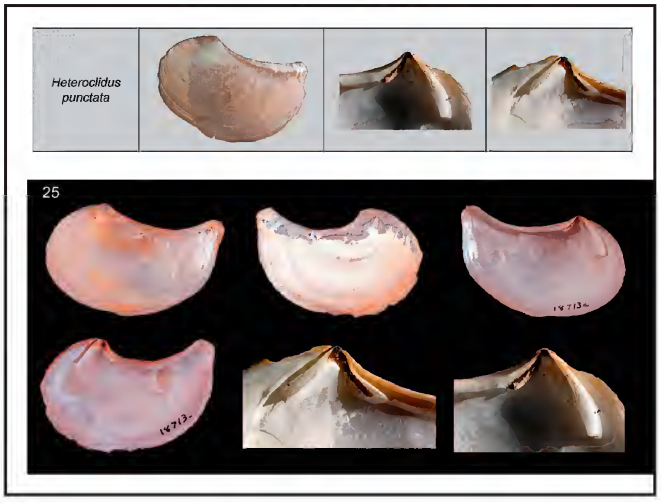
Wilson, N. G., D. Huang, et al. (2009). "Field collection of Laevipilina hyalina McLean, 1979 from southern California, the most accessible living monoplacophoran." Journal of Molluscan Studies 75: 195-197.



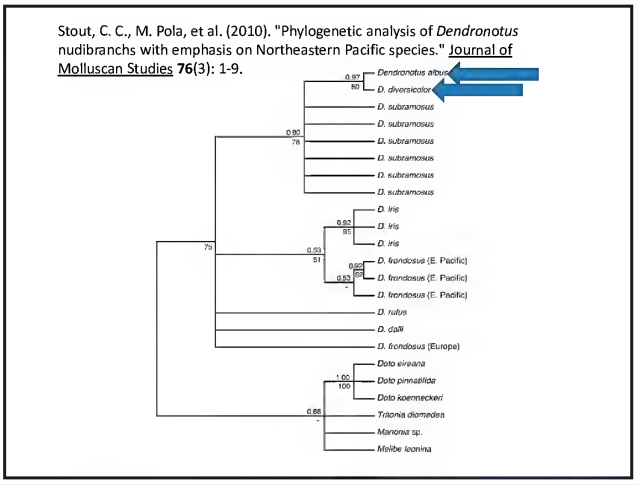
- Provides images of live specimens of local (Tanner and Corteze Bank area) monoplacophoran species on phosphoric nodules collect with a Van Veen

Valentich-Scott, P. and C. Skoglund (2010). "A review of the Recent Pandoridae (Bivalvia) in the Panamic Province, with descriptions of three new species." The Nautilus **124**(2): 55-76.

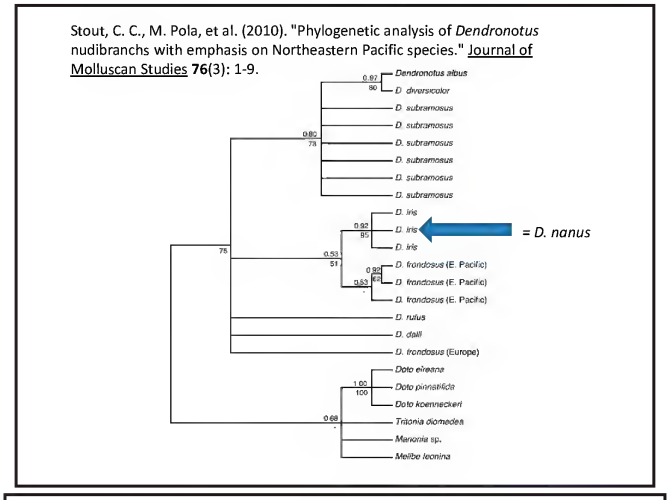
- Many subgenera elevated to generic status. Based on hinge structure.



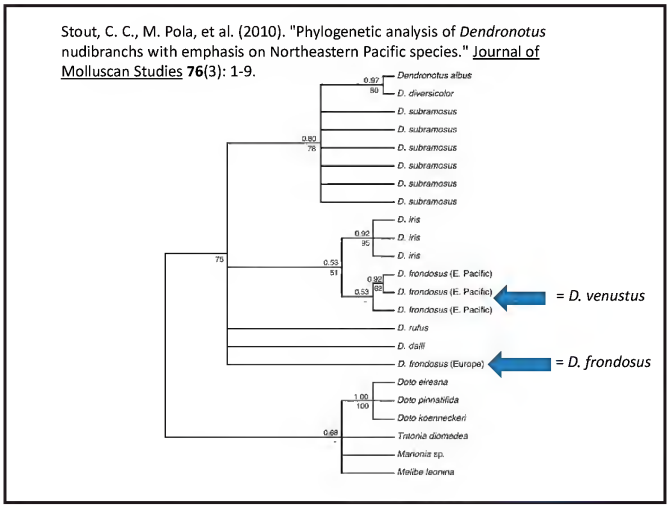
- [*Pandora punctata* Conrad, 1837] = *Heteroclidus punctata* (Conrad, 1837)



- *Dendronotus diversicolor* and *D. albus* are synonymized


Stout, C. C., M. Pola, et al. (2010). "Phylogenetic analysis of Dendronotus nudibranchs with emphasis on Northeastern Pacific species." Journal of Molluscan Studies 76(3): 1-9.
= D. nanus

- *Dendronotus nanus* and *D. iris* are also regarded as synonyms based on a re-evaluation of ecological and morphological data; no **genetic** data available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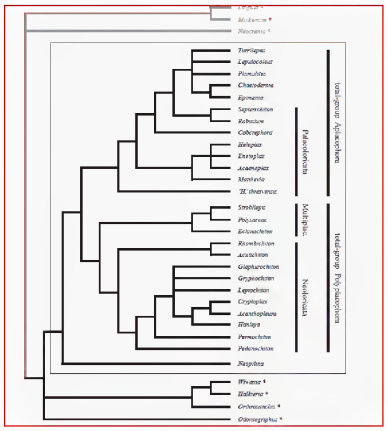
= D. venustus
= D. frondosus

- *D. venustus* is resurrected for eastern Pacific populations previously considered to be *D. frondosus*. Pacific *D. venustus* display consistent morphological and molecular differences from Atlantic *D. frondosus*.

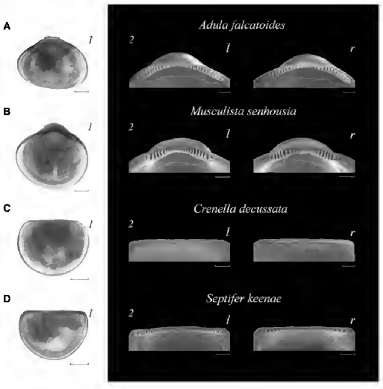
- Pacific species of *Dendronotus* are not a monophyletic group

Sigwart, J. D. and M. D. Sutton (2007). "Deep molluscan phylogeny: synthesis of palaeontological and neontological data." Proceedings of the Royal Society of London, B. - Biological Sciences **274**: 2413-2419.



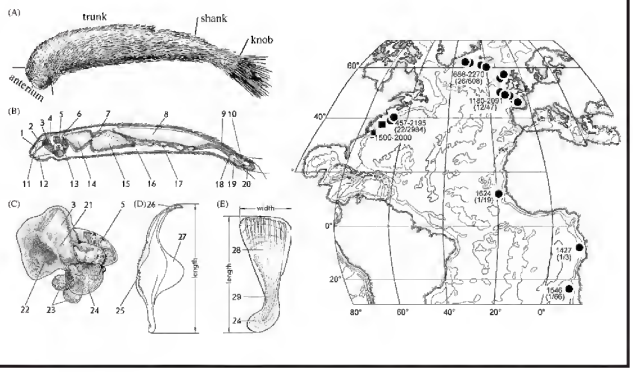
- A new cladistic analysis incorporating both Palaeozoic and extant molluscs is presented here. … results support the monophyly of Aculifera and suggest that extant aplacophorans and polyplacophorans both derive from a disparate group of multivalved molluscs in two major clades
- Helminthochiton' thraivensis shows that this animal lacks a true foot despite bearing polyplacophoran like valves… footless stem-group aplacophorans

Semenikhina, O. Ya., N. K. Kolotukhna, et al. (2008). "Morphology of larvae of the family Mytilidae (Bivalvia) from the north-western part of the Sea of Japan." Journal of the Marine Biological Association of the United Kingdom **88**(2): 331-339.

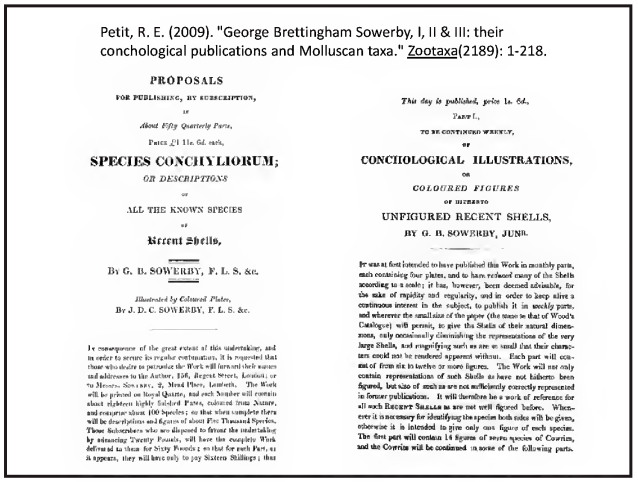


- The larval shell morphology of 10 bivalve species of the family Mytilidae

Scheltema, A. H. and D. L. Ivanov (2009). "A natural history of the deep-sea aplacophoran *Prochaetoderma yongei* and its relationship to confamilials (Mollusca, Prochaetodermatidae)." Deep-Sea Research II **56**: 1856-1864.



- *Prochaetoderma yongei* Scheltema, 1985, appears to be an opportunist, with wide geographic and depth distribution (bathyl depths), rapid development from lecithotrophic larva to settlement and maturity, and omnivory.


Petit, R. E. (2009). "George Brettingham Sowerby, I, II & III: their conchological publications and Molluscan taxa." Zootaxa(2189): 1-218.

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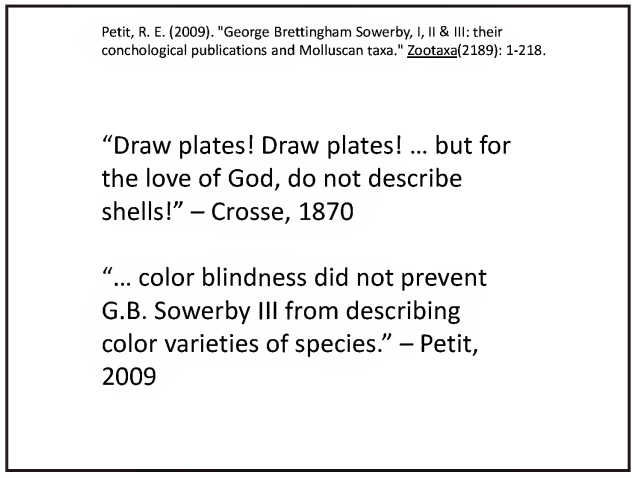
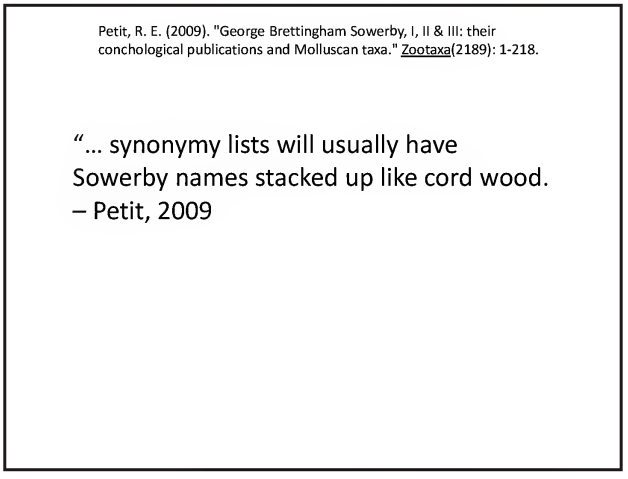
It was at first intended to have published this Work in monthly parts, each containing four plates, and to have reduced many of the Shells according to a scale; it has, however, been deemed advisable, for the sake of rapidity and regularity, and in order to keep alive a continuous interest in the subject, to publish it in weekly parts, and wherever the small size of the genus (the same as that of Wood's Cabinet) will permit, to give the Shells of their natural dimensions, only occasionally diminishing the representations of the very large Shells, and magnifying such as are so small that their characters could not be rendered apparent without. Each part will consist of from six to twelve or more figures. The Work will not only contain representations of such Shells as have not hitherto been figured, but also of such as are not sufficiently correctly represented in former publications. It will therefore be a work of reference for all such RECENT SHELLS as are not well figured before. Whenever it is necessary for identifying the species both sides will be given, otherwise it is intended to give only one figure of each species. The first part will contain 14 figures of seven species of Cowries, and the Cowries will be continued in some of the following parts.


Petit, R. E. (2009). "George Brettingham Sowerby, I, II & III: their conchological publications and Molluscan taxa." Zootaxa(2189): 1-218.

"Draw plates! Draw plates! … but for the love of God, do not describe shells!" – Crosse, 1870

"… color blindness did not prevent G.B. Sowerby III from describing color varieties of species." – Petit, 2009

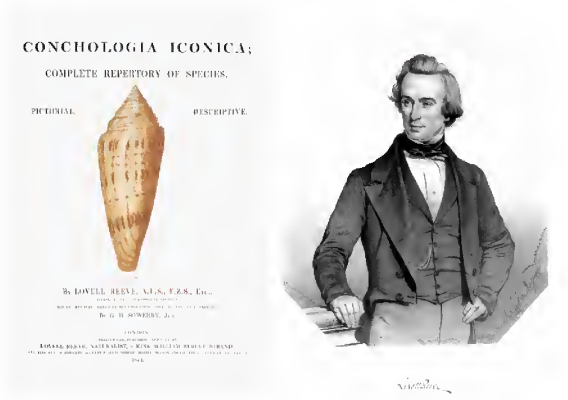

Petit, R. E. (2009). "George Brettingham Sowerby, I, II & III: their conchological publications and Molluscan taxa." Zootaxa(2189): 1-218.

"… synonymy lists will usually have Sowerby names stacked up like cord wood. – Petit, 2009

- Several members of the Sowerby family were artists and authors of natural history works in the 19th Century… George Brettingham Sowerby, his son, and his grandson (I, II & III)… Complete molluscan bibliographies

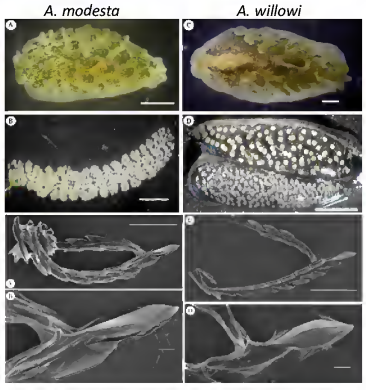
- Draw plates! Draw plates! … but for the love of God, do not describe shells!"— (Crosse 1870)

Petit, R. E. (2007). "Lovell Augustus Reeve (1814–1865): malacological author and publisher." Zootaxa **1648**: 1-120.



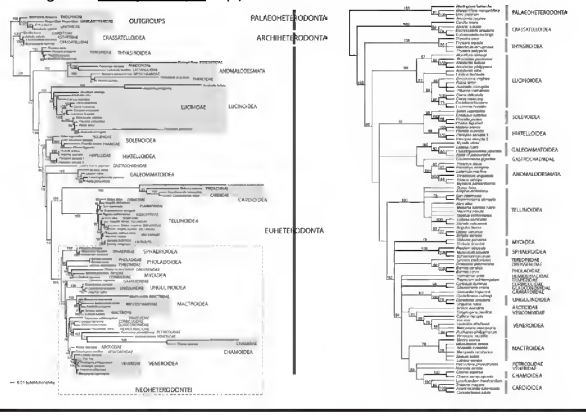
- Lovell Reeve was a major figure in 19th Century malacology in England… listing and describing his conchological publications and dating and collating those that were serially published

Krug, P. J., R. A. Ellingson, et al. (2007). "A new poecilogonous species of sea slug (Opisthobranchia: Sacoglossa) from California: comparison with the planktotrophic congener *Alderia modesta* (Lovén, 1844)." Journal of Molluscan Studies **73**: 29-38.

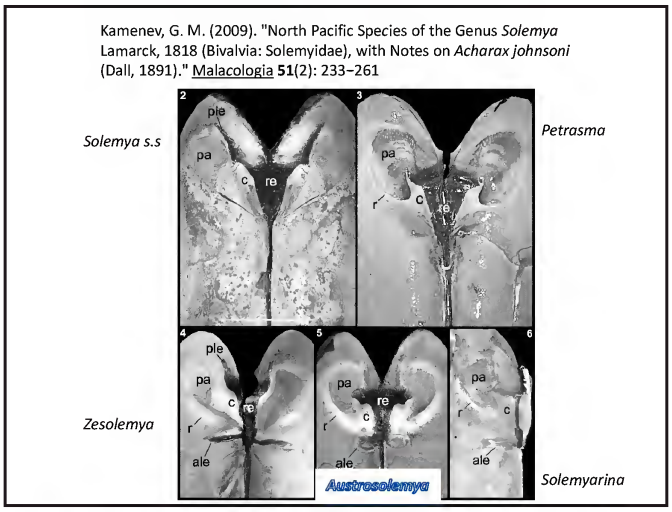


- *Alderia modesta* populations south of Bodega Harbor, California new species *A. willowi*… in southern California, slugs resembling this member of a monotypic genus produce both long lived, planktotrophic and short lived, lecithotrophic larvae… *A. modesta* is exclusively planktotrophic everywhere else in the northern Pacific and Atlantic Oceans

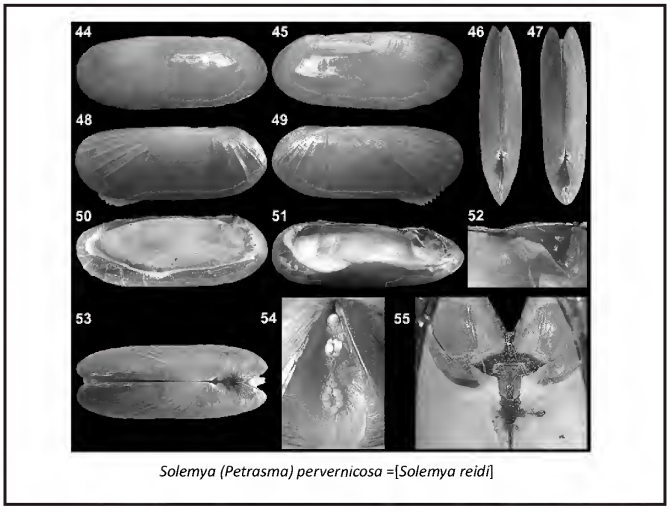
Taylor, J. D., S. T. Williams, et al. (2007). "A molecular phylogeny of heterodont bivalves (Mollusca : Bivalvia : Heterodonta): new analyses of 18S and 28S rRNA genes." Zoologica Scripta **36**(6): 587-606.



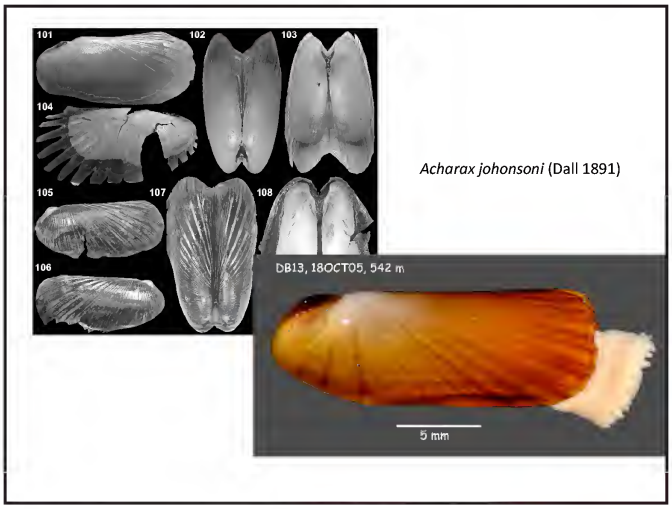
- Highlights include Tellinidae, Donacidae not monophyletic
- *Hiatella* grouped with Solenoidea (different order)
- •Lucinoidea not monophyletic (Thyasiridae and Ungulinidae should be removed from the superfamily);
- Chemosymbiosis separately derived Thyasiridae and Lucinidae (removed from super family)
- Perpiplomatidea not include in study of Anomalodesmata



- 5 Subgenera are described and illustrated (based largely on hinge morphology)

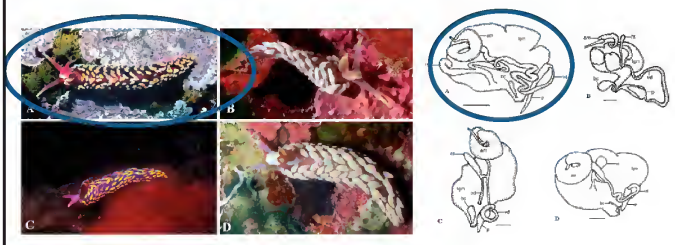


- The gutless *Solemya reidi* from the northeastern Pacific is synonomyzed with *S. pervernicosa* from the northwestern Pacific

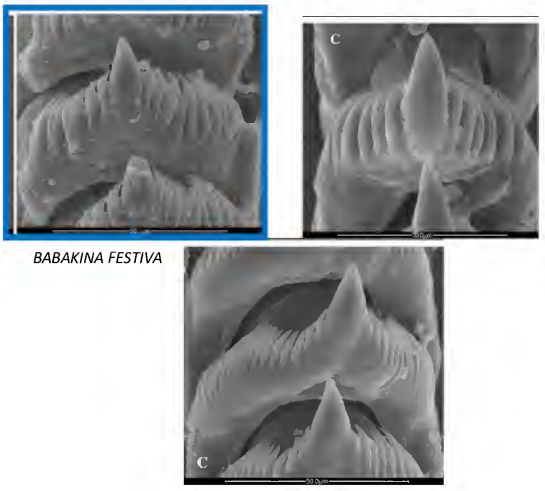


- Additional data on the distribution and ecology of *A. johnsoni*

Gosliner, T. M., M. M. González-Duarte, et al. (2007). "Revision of the systematics of *Babakina* Roller, 1973 (Mollusca: Opisthobranchia) with the description of a new species and a phylogenetic analysis." Zoological Journal of the Linnean Society **151**(4): 671-689.



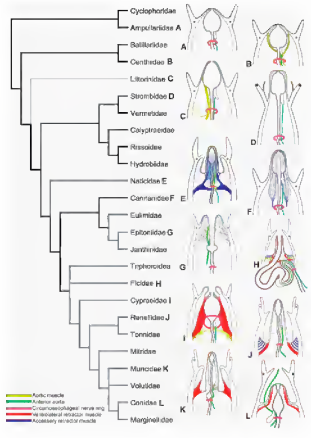
BABAKINA FESTIVA (ROLLER, 1972)



BABAKINA FESTIVA

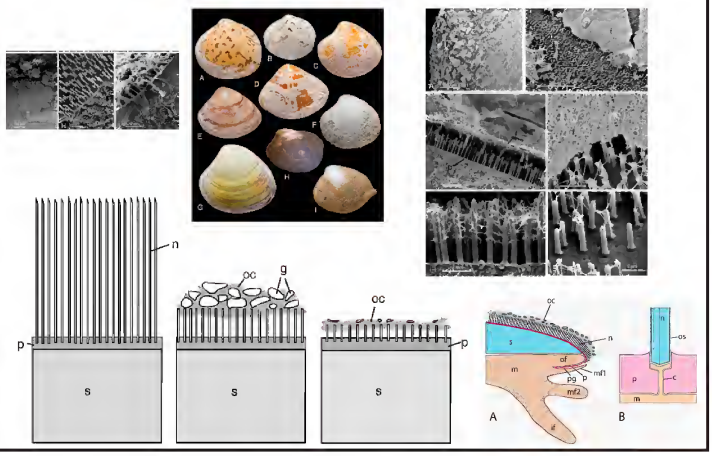
- A lack of information has produced confusion in the identification of the specimens and the number of valid species
- New species from the Tropical Pacific is described (*Babakina indopacifica sp. nov.)*
- *B. festiva* from California and Japan
- Difference in the arrangement of the receptaculum seminis, shape of the penis, and shape and size of the bursa copulatrix are consistent between distinct species from different geographical regions.
- Radular morphology does not exhibit significant differences in phylogeny suggests that Babakinidae should be maintained as a distinct taxon separated from Flabellinidae and Facelinidae

Golding, R. E., W. F. Ponder, et al. (2009). "The evolutionary and biomechanical implications of snout and proboscis morphology in Caenogastropoda (Mollusca: Gastropoda)." Journal of Natural History **43**: 2723-2763.



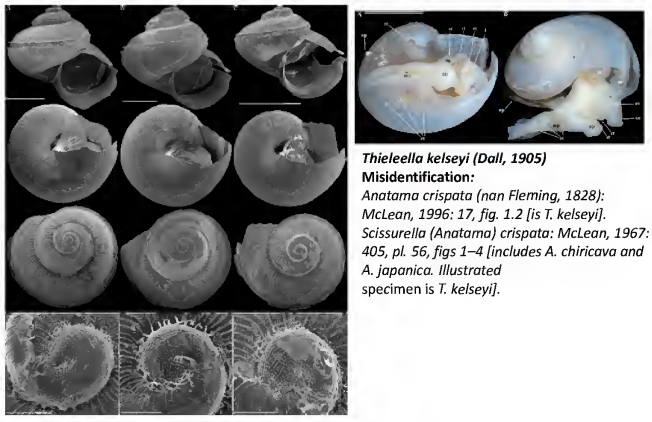
- Caenogastropod proboscises are a complex morphological adaptation to a carnivorous diet
- Previoiusly undescribed diversity in both snout/proboscis wall composition and introversion/ retraction musculature suggest that a proboscis evolved separately in at least four separate caenogastropod groups

Glover, E. A. and J. D. Taylor (2009). "Needles and Pins: Acicular Crystalline Periostracal Calcification in Venerid Bivalves (Bivavia: Veneridae)." Journal of Molluscan Studies Advance Access **00**: 1-23.



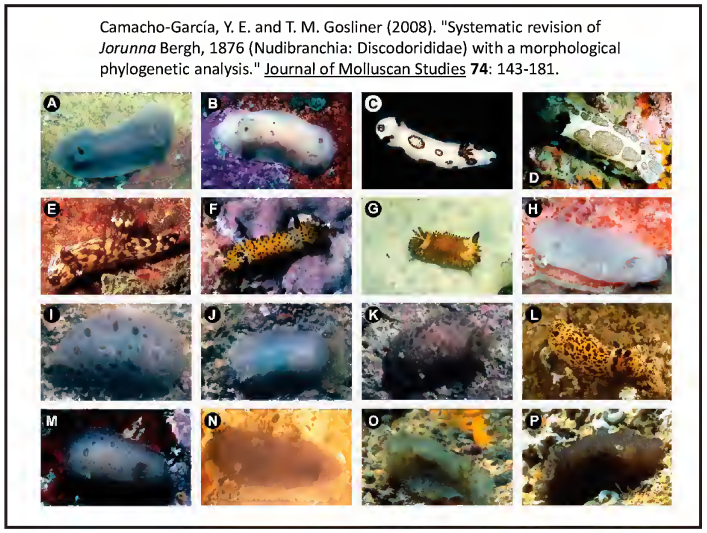
- A scanning electron microscope study of the periostracum of 50 species of venerid bivalves revealed that periostracal calcification in the form of aragonitic needles and shorter pins is widespread within the family.
- Together with organic and sediment coatings that are found in some species, these needles form an integral part of the functional shell
- Often missing in museum collections due to "cleaning" of shells

Geiger, D. L. and J. H. McLean (2010). "New species and records of Scissurellidae and Anatomidae from the Americas (Mollusca: Gastropoda: Vetigastropoda)." Zootaxa(2356): 1-35.

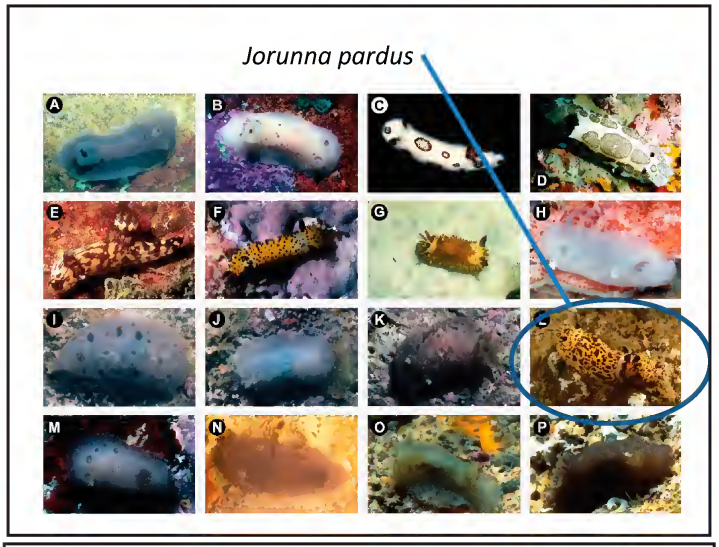


Thieleella kelseyi (Dall, 1905)
Misidentification:
Anatama crispata (nan Fleming, 1828): McLean, 1996: 17, fig. 1.2 [is T. kelseyi]. Scissurella (Anatama) crispata: McLean, 1967: 405, pl. 56, figs 1–4 [includes A. chiricava and A. japanica. Illustrated specimen is *T. kelseyi].*

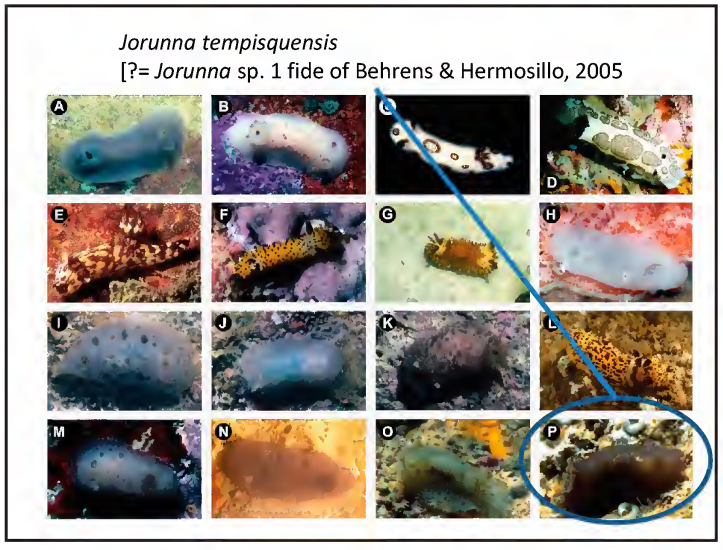
- *Thieleella kelseyi* (Dall, 1905) is resurrected for what has previously been misidentified as the European
- *Anatoma crispata* (Fleming, 1828) in the northeastern Pacific, with a neotype designated, as the holotype is missing.


Camacho-García, Y. E. and T. M. Gosliner (2008). "Systematic revision of *Jorunna* Bergh, 1876 (Nudibranchia: Discodoridae) with a morphological phylogenetic analysis." Journal of Molluscan Studies **74**: 143-181.

- Includes table of characters for Eastern Pacific species

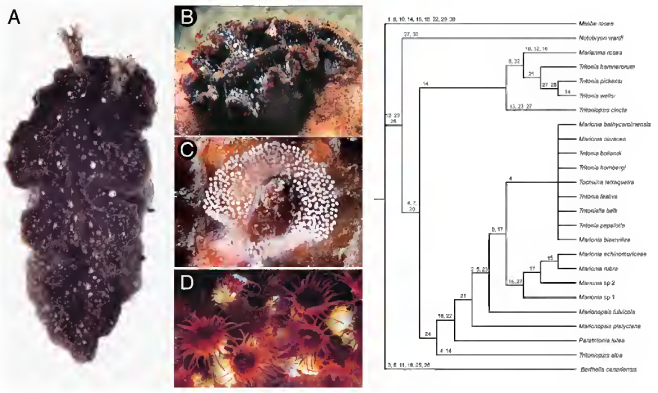


- Description of Jorunna pardus and description of two new species from Costa Rica of *Jarunna*



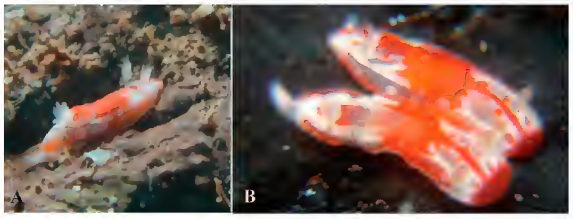
- Description of *Jorunna pardus* and description of two new species from Costa Rica of *Jarunna*

Bertsch, H., A. Valdes, et al. (2009). "A New Species of Tritoniid Nudibranch, the First Found Feeding on a Zoanthid Anthozoan, with a Preliminary Phylogeny of the Tritoniidae." Proceedings of the California Academy of Scineces **60**(12): 431-446.



- The first tritoniid nudibranch known to feed on zoanthid anthozoans. *Tritonia papalotla sp. nov.*
- Phylogenetic analysis make the generic placement problematic however, Family Tritoniidae appears monopheletic

Behrens, D. W., M. T. Gosliner, et al. (2009). "A New Species of Dorid Nudibranch (Mollusca)from the Revillagigedo Islands of the Mexican Pacific." Proceedings of the California Academy of Scineces **60**(11): 423-429.



Chromodoris socorroensis = [*Chromodoirs* sp 1 Behrens and Hermosillo, 2005]

- *Chromodoris socorroensis* = [*Chromodoirs* sp 1 *fide* Behrens and Hermosillo, 2005]

Species	OD genus	Authorship	D&B 1909 sg	Oldroyd 1927(sg)	Abbott 1974 sg	"recommended current usage"
abreojensis	Turbonilla	Dall and Bartsch 1909	Ptycheulimella	NA	Ptycheulimella	leave as Eulimella per Aartsen et al 1998
acra	Turbonilla	Dall and Bartsch 1909	Turbonilla	Turbonilla	Turbonilla	leave as Turbonilla
acrybia	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	Chrysallida	use as Chrysallida
aculeus	Chemnitzia	C. B. Adams 1852	Chemnitzia	NA	NA	leave as Turbonilla
adusta	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
aepynota	Turbonilla	Dall and Bartsch 1909	Chemnitzia	(Chemnitzia)	Chemnitzia	leave as Turbonilla
aepynota	Odostomia	Dall and Bartsch 1909	Miralda	(Miralda)	Miralda	use as Liamorpha per Aartsen et al 1998
aequisculpta	Odostomia	Carpenter 1864	Menestho	NA	Menestho	use as Menestho
affinis	Chemnitzia	C. B. Adams 1852	Strioturbonilla	NA	NA	leave as Turbonilla
alarconi	Turbonilla	Strong 1949	NA	NA	Pyrgiscus	use as Pyrgiscus
alaskana	Turbonilla	Dall and Bartsch 1909	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
albula	?	Fabricius, 1780	NA	NA	NA	Menestho [added per P. Lafollette]
aleutica	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
almejasensis	Turbonilla	Bartsch 1917	NA	NA	Pyrgiscus	use as Pyrgiscus
*almo	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	NA	leave as Turbonilla
altina	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
ambusta	Turbonilla	Dall and Bartsch 1909	Mormula	(Mormula)	Mormula	syn of tridentata per Abbott
amchitkana	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
americana	Odostomia	Dall and Bartsch 1904	Evalina	(Evalina)	Evalina	use as Evalina
amianta	Odostomia	Dall and Bartsch 1907	Iolaea	(Iolaea)	Iolaea	use as Iolaea
amiantropsis	?	McNeil 1943	NA	NA	NA	syn of truncatula per P. Lafollette
amilda	Odostomia	Dall and Bartsch 1909	Menestho	(Menestho)	Menestho	use as Menestho
amortajadensis	Turbonilla	Baker, Hanna & Strong 1928	NA	NA	Chemnitzia	leave as Turbonilla
andrewsi	Turbonilla	Dall and Bartsch 1909	Dunkeria	NA	NA	leave as Turbonilla
angularis	Odostomia	Dall and Bartsch 1907	Evalea	(Evalea)	Evalea	Brachystomia in McLean 2007
angusta	Chrysallida	Carpenter 1864	Pyrgiscus	NA	NA	use as Pyrgiscus
annettae	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	NA	use as Pyrgiscus
antemunda	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	syn of tenuicula per Abbott
antestriata	Turbonilla	Dall and Bartsch 1907	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
aragoni	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
arata	Turbonilla	Dall and Bartsch 1909	Dunkeria	(Bartschella)	Pyrgiscus	syn of weldi per Abbott
arctica	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	Amaura	use as Aartsenia
aresta	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
aripana	Turbonilla	Strong 1949	NA	NA	Pyrgiscus	use as Pyrgiscus
asser	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	syn of stylina per Abbott
*astricta	Odostomia	Dall and Bartsch 1907	Chrysallida	(Chrysallida)	Chrysallida	use as Boonea
asuncionis	Turbonilla	Strong 1949	NA	NA	Strioturbonilla	leave as Turbonilla
atossa	Odostomia	Dall 1908	Evalea	(Evalea)	Evalea	use as Evalea
attrita	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
audax	Odostomia	Baker, Hanna & Strong 1928	NA	NA	Chrysallida	use as Chrysallida
aurantia	Chemnitzia	Carpenter 1864	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
auricoma	Turbonilla	Dall and Bartsch 1903	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus

avellana	Odostomia	Carpenter 1865	Amaura	(Amaura)	NA	use as Aartsenia
azteca	Turbonilla	Baker, Hanna & Strong 1928	NA	NA	Pyrgiscus	use as Pyrgiscus
bachia	Odostomia	Bartsch 1927	NA	NA	Evalea	use as Evalea
baegerti	Turbonilla	Bartsch 1917	NA	NA	Pyrgiscus	use as Pyrgiscus
bakeri	Turbonilla	Bartsch 1912	NA	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
baldridgeae	Odostomia	Bartsch 1912	NA	(Evalea)	Evalea	use as Evalea
baranoffensis	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
barkleyensis	Turbonilla	Bartsch 1917	NA	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
barkleyensis	Odostomia	Dall and Bartsch 1910	NA	(Evalea)	Evalea	use as Evalea
bartolomensis	Turbonilla	Bartsch 1917	NA	NA	Pyrgiscus	use as Pyrgiscus
bartschi	Turbonilla	Smith & Gordon 1948	NA	NA	Bartschella	syn of pauli per Abbott
bartschiana	Turbonilla	Smith & Gordon 1950	NA	NA	Bartschella	use as Bartschella
benthina	Chrysallida	Carpenter 1856	Chrysallida	NA	NA	use as Chrysallida
beringi	Odostomia	Dall 1871	Amaura	(Amaura)	Amaura	use as Aartsenia
berryi	Turbonilla	Dall and Bartsch 1907	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	syn of chocolata per Abbott
bisuturalis	Menestho	Say 1812	NA	NA	NA	Odetta in McLean 2007 [introduced]
burchi	Turbonilla	Gordon 1938	NA	NA	Pyrgiscus	use as Pyrgiscus
buttoni	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	syn of stylina per Abbott
cabrilloi	Turbonilla	Bartsch 1917	NA	NA	Pyrgiscus	use as Pyrgiscus
calcarella	Odostomia	Bartsch 1912	NA	(Evalea)	Evalea	use as Evalea
californica	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	use as Evalea
callia	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
callimene	Turbonilla	Bartsch 1912	NA	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
callimene	Odostomia	Bartsch 1912	NA	(Evalea)	Evalea	use as Evalea
callimorpha	Odostomia	Dall and Bartsch 1909	Besla	(Besla)	Besla	use as Besla
calliope	Odostomia	Bartsch 1912	NA	(Evalea)	Evalea	use as Evalea
callipeplum	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	NA	use as Pyrgiscus
callipyrga	Odostomia	Dall and bartsch 1904	Menestho	NA	NA	use as Odetta
calvini	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	NA	Strioturbonilla	syn of stylina per Abbott
canadensis	Turbonilla	Bartsch 1917	NA	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
cancellata	Dunkeria	Carpenter 1856	Pyrgisculus	NA	NA	leave as Turbonilla
canfieldi	Turbonilla	Dall and Bartsch 1907	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
*canfieldi	Odostomia	Dall 1908	Amaura	(Amaura)	Amaura	use as Aartsenia
capitana	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
carpenteri	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
cassandra	Odostomia	Bartsch 1912	NA	(Evalea)	Odostomia	use as Odostomia
*castanea	Chemnitzia	Keep 1888	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
castanella	Turbonilla	Dall 1908	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
catalinensis	Turbonilla	Dall and Bartsch 1909	Mormula	(Mormula)	Mormula	syn of tridentata per Abbott
catalinensis	Odostomia	Bartsch 1927	NA	NA	Chrysallida	use as Chrysallida
cayucosensis	Chemnitzia	Willett 1929	NA	NA	Chemnitzia	syn of gabbiana per Abbott
c-b-adamsi	Chemnitzia	Carpenter 1856	Strioturbonilla	NA	NA	leave as Turbonilla
centrota	Chemnitzia	Dall and Bartsch 1909	Turbonilla	NA	Turbonilla	leave as Turbonilla

ceralva	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	Pyrgiscus	use as Pyrgiscus
chalcana	Turbonilla	Baker, Hanna & Strong 1928	NA	NA	Strioturbonilla	leave as Turbonilla
*chocolata	Chemnitzia	Carpenter 1866	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
churchi	Odostomia	Smith & Gordon 1948	NA	NA	Menestho	use as Menestho
ciguatonis	Odostomia	Strong 1949	NA	NA	Menestho	use as Menestho
cincta	Chrysallida	Carpenter 1864	Chrysallida	(Chrysallida)	Chrysallida	use as Chrysallida
cinctella	Turbonilla	Mörch 1859	Pyrgiscus	NA	NA	use as Pyrgiscus
clarinda	Turbonilla	Bartsch 1912	NA	(Chemnitzia)	Chemnitzia	leave as Turbonilla
clathratula	Chemnitzia	C. B. Adams 1852	Chrysallida	NA	NA	use as Chrysallida
clausiliformis	Chrysallida	Carpenter 1856	Lysacme	NA	NA	use as Lysacme
clementensis	Odostomia	Bartsch 1927	NA	NA	Chrysallida	use as Chrysallida
*clementina	Turbonilla	Bartsch 1927	NA	NA	Mormula	leave as Turbonilla
clementina	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	NA	use as Chrysallida
clessini	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
cochimana	Turbonilla	Strong 1949	NA	NA	Pyrgiscus	use as Pyrgiscus
*columbiana	Odostomia	Dall and Bartsch 1907	Evalea	(Evalea)	Evalea	use as Evalea
communis	Chemnitzia	C. B. Adams 1852	Chrysallida	NA	NA	use as Chrysallida
contrerasi	Odostomia	Baker, Hanna & Strong 1928	NA	NA	Chrysallida	syn of cincta per Wise
convexa	Chrysallida	Carpenter 1856	Besla	NA	Besla	use as Besla
cookeana	Turbonilla	Bartsch 1912	NA	NA	Strioturbonilla	leave as Turbonilla
cookeana	Odostomia	Bartsch 1912	NA	(Evalea)	Evalea	use as Evalea
cooperi	Odostomia	Dall and Bartsch 1907	Chrysallida	(Chrysallida)	NA	use as Chrysallida
cora	Chemnitzia	D'Orbigny 1847	Pyrgiscus	NA	NA	syn of astricta per Ed. 5
coronadoensis	Odostomia	Dall and Bartsch 1909	Odostomia	(Odostomia)	NA	use as Odostomia
corsoensis	Turbonilla	Bartsch 1917	NA	NA	Pyrgiscus	use as Pyrgiscus
cortezi	Turbonilla	Bartsch 1917	NA	NA	Pyrgiscus	use as Pyrgiscus
coyotensis	Turbonilla	Baker, Hanna & Strong 1928	NA	NA	Mormula	leave as Turbonilla
craticulata	Turbonilla	Mörch 1859	Pyrgiscus	NA	NA	use as Pyrgiscus
crebrifilata	Turbonilla	Carpenter 1864	NA	NA	Pyrgiscus	syn of tenuicula per Abbott
cumshewaensis	Odostomia	Bartsch 1921	NA	(Chrysallida)	Chrysallida	use as Chrysallida
cypria	Odostomia	Dall and Bartsch 1910	NA	(Evalea)	Evalea	use as Evalea
deceptrix	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	NA	syn of cincta per Wise
delicatula	Odostomia	Carpenter 1864	Iolaea	NA	Iolaea	use as Iolaea
deliciosa	Odostomia	Dall and Bartsch 1907	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
delmontana	Turbonilla	Bartsch 1937	NA	NA	Pyrgiscus	use as Pyrgiscus
delmontensis	Turbonilla	Dall and Bartsch 1907	NA	NA	NA	leave as Turbonilla
delmontensis	Turbonilla	Bartsch 1927	NA	NA	Pyrgiscus	syn of delmontana per Abbott
dicella	Odostomia	Bartsch 1912	NA	(Chrysallida)	Chrysallida	use as Chrysallida
*diegensis	Turbonilla	Dall and Bartsch 1909	Turbonilla	Turbonilla	Turbonilla	leave as Turbonilla
dina	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	NA	use as Pyrgiscus
dinella	Odostomia	Dall and Bartsch 1909	Odostomia	(Odostomia)	Odostomia	use as Odostomia
dinora	Turbonilla	Bartsch 1912	NA	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
domingana	Turbonilla	Hertlein and Strong 1951	NA	NA	Pyrgiscus	use as Pyrgiscus

donilla	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	use as Evalea
dora	Turbonilla	Bartsch 1917	NA	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
doredona	Turbonilla	Bartsch 1917	NA	(Strioturbonilla)	NA	leave as Turbonilla
dotella	Odostomia	Dall and Bartsch 1909	Scalenostoma	NA	Eulimastoma	use as Eulimastoma
dracona	Turbonilla	Bartsch 1912	NA	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
edmondi	Odostomia	E. Jordan 1920	NA	(Evalea)	Evalea	use as Evalea
effusa	Chrysallida	Carpenter 1856	Chrysallida	NA	NA	use as Chrysallida
eldorana	Odostomia	Bartsch 1912	NA	(Amaura)	Amaura	use as Aartsenia
elsa	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	Amaura	use as Aartsenia
encella	Turbonilla	Bartsch 1912	NA	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
engbergi	Turbonilla	Bartsch 1920	NA	(Chemnitzia)	Chemnitzia	leave as Turbonilla
engbergi	Odostomia	Bartsch 1920	NA	(Amaura)	Amaura	use as Aartsenia
enna	Turbonilla	Bartsch 1927	NA	NA	Mormula	leave as Turbonilla
enora	Odostomia	Dall and Bartsch 1909	Menestho	(Menestho)	Menestho	use as Menestho
eshscholtzi	Turbonilla	Dall and Bartsch 1907	Mormula	(Mormula)	Mormula	leave as Turbonilla
esilda	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	use as Evalea
*eucosmia	Odostomia	Dall and Bartsch 1909	Iolaea	(Iolaea)	Iolaea	use as Iolaea
eucosmia	Turbonilla	Dall and Bartsch 1909	Pyrgisculus	NA	NA	leave as Turbonilla
eucosmobasis	Turbonilla	Dall and Bartsch 1907	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
*eugena	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	Chrysallida	use as Chrysallida
euglypta	Odostomia	E. K. Jordan 1921	NA	(Chrysallida)	Chrysallida	use as Chrysallida
eva	Turbonilla	Bartsch 1917	NA	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
exara	Odostomia	Dall and Bartsch 1907	Menestho	(Menestho)	Menestho	use as Menestho
exarata	Parthenia	Carpenter 1856	Miralda	NA	NA	use as Liamorpha per Aartsen et al 1998
excelsa	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	NA	use as Chrysallida
excisa	Odostomia	Bartsch 1912	NA	(Menestho)	Menestho	use as Menestho
excolpa	Turbonilla	Dall and Bartsch 1909	Dunkeria	NA	Besla	leave as Turbonilla
eyerdami	Turbonilla	Bartsch 1927	NA	NA	Pyrgolampros	leave as Turbonilla
eyerdami	Odostomia	Bartsch 1927	NA	NA	Evalea	use as Evalea
fackenthallas	Turbonilla	Smith & Gordon 1948	NA	NA	Turbonilla	leave as Turbonilla
farallonensis	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	Amaura	use as Aartsenia
farella	Odostomia	Dall and Bartsch 1909	Odostomia	(Odostomia)	NA	use as Odostomia
farma	Odostomia	Dall and Bartsch 1909	Menestho	(Menestho)	Menestho	use as Menestho
fasciata	Chrysallida	Carpenter 1856	Chrysallida	NA	NA	use as Chrysallida
favilla	Chemnitzia	Carpenter 1865	Pyrgiscus	NA	NA	use as Pyrgiscus
festiva	Turbonilla	de Folin 1867	Pyrgisculus	NA	NA	use as Pyrgiscus
fetella	Odostomia	Dall and Bartsch 1909	Menestho	(Menestho)	Menestho	Odetta in McLean 2007
fia	Odostomia	Bartsch 1927	NA	NA	Chrysallida	use as Chrysallida
flavescens	Chemnitzia	Carpenter 1856	Pyrgiscus	NA	NA	use as Pyrgiscus
franciscana	Turbonilla	Bartsch 1917	NA	(Pyrolampros)	Pyrgolampros	leave as Turbonilla
franciscana	Odostomia	Bartsch 1917	NA	(Evalea)	Evalea	use as Evalea
francisquitana	Turbonilla	Baker, Hanna & Strong 1928	NA	NA	Pyrgolampros	leave as Turbonilla
gabbiana	Turbonilla	Cooper 1870	Chemnitzia	(Chemnitzia)	Chemnitzia	leave as Turbonilla

gabrielensis	Odostomia	Baker, Hanna & Strong 1928	NA	NA	Salassiella	use as Salassiella
galapagensis	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	NA	NA	leave as Turbonilla
galapagensis	Odostomia	Dall and Bartsch 1909	Miralda	NA	NA	use as Liamorpha per Aartsen et al 1998
galianoi	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	syn of stylina per Abbott
genilda	Turbonilla	Dall and Bartsch 1909	Dunkeria	NA	NA	leave as Turbonilla
gibbosa	Chemnitzia	Carpenter 1856	Pyrgolampros	NA	NA	leave as Turbonilla
gilli	Turbonilla	Dall and Bartsch 1907	Turbonilla	Turbonilla	Turbonilla	leave as Turbonilla
gilli delmontensis	Turbonilla	Dall and Bartsch 1907	Turbonilla	Turbonilla	Turbonilla	leave as Turbonilla
gloriosa	Turbonilla	Bartsch 1912	NA	(Pyrolampros)	Pyrgolampros	leave as Turbonilla
gloriosa	Odostomia	Bartsch 1912	NA	(Menestho)	Menestho	use as Menestho
gonzagensis	Turbonilla	Baker, Hanna & Strong 1928	NA	NA	Pyrgolampros	leave as Turbonilla
gouldi	Turbonilla	Dall and Bartsch 1909	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	syn of aurantia per Abbott
gouldi	Odostomia	Carpenter 1865	Amaura	NA	NA	use as Aartsenia
gracillima	Chemnitzia	Carpenter 1856	Pyrgiscus	NA	Chemnitzia	syn of gabbiana per Abbott
gracilior	Chemnitzia	C. B. Adams 1852	Strioturbonilla	NA	NA	leave as Turbonilla
grammatospira	Odostomia	Dall and Bartsch 1903	Menestho	NA	NA	use as Menestho
granadensis	Odostomia	Dall and Bartsch 1909	Evalea	NA	NA	use as Evalea
gravida	Odostomia	Gould 1853	Evalea	(Evalea)	Evalea	use as Evalea
grippi	Turbonilla	Bartsch 1912	NA	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
grippiana	Odostomia	Bartsch 1912	NA	(Amaura)	Amaura	use as Aartsenia
grijalvae	Odostomia	Baker, Hanna & Strong 1928	NA	NA	Menestho	use as Menestho
guaicurana	Turbonilla	Strong 1949	NA	NA	Pyrgiscus	use as Pyrgiscus
hagemeisteri	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
halia	Turbonilla	Dall and Bartsch 1909	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	syn of chocolata per Abbott
halibrecta	Turbonilla	Dall and Bartsch 1909	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
halidoma	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	Pyrgiscus	use as Pyrgiscus
halistrepta	Turbonilla	Dall and Bartsch 1909	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
harfordensis	Odostomia	Dall and Bartsch 1907	Menestho	(Menestho)	Menestho	use as Menestho
heathi	Odostomia	Smith & Gordon 1948	NA	NA	Salassiella	use as Salassiella
helena	Odostomia	Bartsch 1912	NA	(Amaura)	Amaura	use as Aartsenia
helga	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	Chrysallida	use as Chrysallida
hemphilli	Odostomia	Dall and Bartsch 1909	Miralda	(Miralda)	Miralda	use as Liamorpha per Aartsen et al 1998
herilda	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
heterocincta	Odostomia	Bartsch 1912	NA	(Chrysallida)	Chrysallida	use as Chrysallida
heterolopha	Turbonilla	Dall and Bartsch 1909	Mormula	(Mormula)	Mormula	leave as Turbonilla
hipolitensis	Turbonilla	Dall and Bartsch 1909	Dunkeria	NA	NA	leave as Turbonilla
hipolitensis	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	NA	syn of cincta per Wise
histias	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	Pyrgiscus	use as Pyrgiscus
houseri	Turbonilla	Dall and Bartsch 1909	Chemnitzia	NA	NA	leave as Turbonilla
humerosa	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	syn of stylina per Abbott
hypatia	Odostomia	Dall and Bartsch 1912	NA	(Evalea)	Evalea	use as Evalea
hypocurta	Odostomia	Dall and Bartsch 1909	Menestho	(Menestho)	Menestho	syn of albula per P. Lafollette
hypolispa	Turbonilla	Dall and Bartsch 1909	Chemnitzia	(Chemnitzia)	Chemnitzia	leave as Turbonilla

ignacia	Turbonilla	Dall and Bartsch 1909	Mormula	NA	Mormula	leave as Turbonilla
ilfa	Turbonilla	Bartsch 1927	NA	NA	Pyrgolampros	leave as Turbonilla
iliuliukensis	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	Amaura	use as Aartsenia
ima	Turbonilla	Dall and Bartsch 1909	Turbonilla	NA	NA	leave as Turbonilla
imperialis	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	NA	NA	leave as Turbonilla
ina	Turbonilla	Bartsch 1917	NA	(Pyrgiscus)	NA	use as Pyrgiscus
inconspicua	Cingula	C. B. Adams 1852	Chrysallida	NA	NA	use as Chrysallida
indentata	Chrysallida	Carpenter 1856	Pyrgiscus	NA	NA	use as Pyrgiscus
inflata	Odostomia	Dall and Bartsch 1907	Evalea	(Evalea)	Evalea	use as Evalea
intermedia	Dunkeria	Carpenter 1856	Evalina	NA	NA	use as Evalina
io	Odostomia	Dall and Bartsch 1903	Evalea	(Evalea)	NA	use as Evalea
ista	Turbonilla	Bartsch 1917	NA	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
jewetti	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
jewetti	Odostomia	Dall and Bartsch 1907	Evalea	(Evalea)	NA	use as Evalea
johnsoni	Turbonilla	Baker, Hanna & Strong 1928	NA	NA	Pyrgiscus	use as Pyrgiscus
juani	Turbonilla	Bartsch 1917	NA	NA	Ugartea	leave as Turbonilla
kadiakensis	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
kaliwana	Turbonilla	Strong 1949	NA	NA	Pyrgiscus	use as Pyrgiscus
keepi	Turbonilla	Dall and Bartsch 1909	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	syn of chocolata per Abbott
*kelseyi	Turbonilla	Dall and Bartsch 1909	Chemnitzia	(Chemnitzia)	Chemnitzia	leave as Turbonilla
kelseyi	Odostomia	Bartsch 1912	NA	(Heida)	Odostomia	use as Heida
kennerlyi	Odostomia	Dall and Bartsch 1907	Amaura	(Amaura)	Amaura	use as Aartsenia
killisnooensis	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
kincaidi	Turbonilla	Bartsch 1921		(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
krausei	Odostomia	Clessin 1900	Amaura	(Amaura)	Amaura	use as Aartsenia
lacunata	Parthenia	Carpenter 1856	Egila	NA	NA	use as Egila
laminata	Dunkeria	Carpenter 1864	Dunkeria	(Bartschella)	Bartschella	Bartchella per McLean 2007
lamna	Turbonilla	Bartsch 1917	NA	NA	Pyrgiscus	use as Pyrgiscus
lapazana	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	NA	use as Chrysallida
lara	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	Pyrgiscus	use as Pyrgiscus
larunda	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	Pyrgiscus	use as Pyrgiscus
lastra	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	Amaura	use as Aartsenia
laxa	Odostomia	Dall and Bartsch 1909	Salassiella	(Salassiella)	Salassiella	Trabecula laxa in Ed 5
lazaroensis	Turbonilla	Bartsch 1917	NA	NA	Pyrgiscus	use as Pyrgiscus
lepta	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	Pyrgiscus	use as Pyrgiscus
licina	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	NA	use as Chrysallida
lituyana	Turbonilla	Dall and Bartsch 1909	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
loomisi	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	NA	use as Chrysallida
lordii	Chemnitzia	E. A. Smith 1880	Mormula	(Mormula)	Mormula	leave as Turbonilla
lowei	Turbonilla	Dall and Bartsch 1903	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	syn of chocolata per Abbott
lucana	Turbonilla	Dall and Bartsch 1909	Turbonilla	NA	Turbonilla	leave as Turbonilla
lucasana	Odostomia	Dall and Bartsch 1909	Evalea	NA	NA	use as Evalea
lucca	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	NA	syn of astricta per Ed. 5

lyalli	Turbonilla	Dall and Bartsch 1907	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
macbridei	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	Pyrgiscus	use as Pyrgiscus
macouni	Turbonilla	Dall and Bartsch 1910	NA	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
macra	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	NA	use as Pyrgiscus
magdalinensis	Turbonilla	Bartsch 1927	NA	NA	Ptycheulimella	use Eulimella per Aartsen et al 1998
major	Chemnitzia	C. B. Adams 1852	Mormula	NA	NA	leave as Turbonilla
mammillata	Odostomia	Carpenter 1856	Odostomia	NA	NA	use as Odostomia
mariana	Turbonilla	Bartsch 1917	NA	NA	Pyrgiscus	use as Pyrgiscus
marshalli	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	Pyrgiscus	use as Pyrgiscus
martensi	Odostomia	Dall and Bartsch 1906	Amaura	(Amaura)	Amaura	use as Aartsenia
martinensis	Odostomia	Strong 1938	NA	NA	Evalea	use as Evalea
mayana	Turbonilla	Baker, Hanna & Strong 1928	NA	NA	Pyrgiscus	use as Pyrgiscus
mendozae	Odostomia	Baker, Hanna & Strong 1928	NA	NA	Ividella	use as Ividella
mexicana	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	NA	NA	leave as Turbonilla
middendorfii	Turbonilla	Bartsch 1927	NA	NA	Pyrgolampros	leave as Turbonilla
minutissima	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	syn of raymondi per Corgan 1973
moerchi	Turbonilla	Dall and Bartsch 1907	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
monilifera	Turbonilla	Dall and Bartsch 1909	Pyrgisculus	NA	NA	leave as Turbonilla
montereyensis	Odostomia	Dall and Bartsch 1907	Chrysallida	(Chrysallida)	NA	syn of astricta per Ed. 5
moratora	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	Amaura	use as Aartsenia
movilla	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
muricata	Turbonilla	Carpenter 1856	Chemnitzia	(Chemnitzia)	NA	leave as Turbonilla
muricatoides	Turbonilla	Dall and Bartsch 1907	Chemnitzia	(Chemnitzia)	Chemnitzia	leave as Turbonilla
nahuana	Turbonilla	Baker, Hanna & Strong 1928	NA	NA	Strioturbonilla	leave as Turbonilla
navarettei	Odostomia	Baker, Hanna & Strong 1928	NA	NA	Menestho	use as Menestho
navisa	Odostomia	Dall and Bartsch 1907	Ividella	(Ividella)	Ividella	Ividella in McLean 2007
navisa delmontensis	Odostomia	Dall and Bartsch 1907	Ividella	(Ividella)	NA	use as Ividella
nemo	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
nereia	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
newcombei	Turbonilla	Dall and Bartsch 1907	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
nicholsi	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	NA	Strioturbonilla	syn of stylina per Abbott
nodosa	Chrysallida	Carpenter 1856	Chrysallida	NA	NA	use as Chrysallida
nota	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	NA	syn of pupiformis per McLean 2007
notilla	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	use as Evalea
nuciformis	Odostomia	Carpenter 1865	Amaura	(Amaura)	Amaura	use as Aartsenia
nunivakensis	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
nuttalli	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	NA	use as Pyrgiscus
*nuttingi	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
obesa	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
obesa	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
obsoleta	Eulimella	Carpenter 1856	Ptycheulimella	NA	NA	use Eulimella per Aartsen et al 1998
oldroydi	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	NA	syn of astricta in Ed 5
oonisca	Chrysallida	Carpenter 1856	Chrysallida	NA	NA	use as Chrysallida

orariana	Cingula	Dall andd Bartsch 1909	Ividella	NA	NA	use as Ividella
orcia	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	NA	use as Aartsenia
orcutti	Odostomia	Bartsch 1917	NA	(Odostomia)	NA	use as Odostomia
oregonensis	Turbonilla	Dall and Bartsch 1907	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
oregonensis	Odostomia	Dall and Bartsch 1907	Chrysallida	(Chrysallida)	Chrysallida	Boonea in McLean 2007
ornatissima	Odostomia	(Hass 1943)	NA	NA	Chrysallida	use as Chrysallida
ovata	Chrysallida	Carpenter 1856	Chrysallida	NA	NA	use as Chrysallida
painei	Turbonilla	Dall and Bartsch 1909	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	syn of chocolata per Abbott
panamensis	Chemnitzia	C. B. Adams 1852	Strioturbonilla	NA	NA	leave as Turbonilla
panamensis	Odostomia	Clessin 1900	Heida	NA	NA	use as Heida
paramoea	Chemitzia	Dall and Bartsch 1909	Chemnitzia	NA	NA	leave as Turbonilla
parella	Odostomia	Dall and Bartsch 1909	Evalea	NA	NA	use as Evalea
paucilirata	Dunkeria	Carpenter 1856	Pyrgisculus	NA	NA	leave as Turbonilla
pauli	Turbonilla	Smith & Gordon 1948	NA	NA	Bartschella	use as Bartschella
paupercula	Cingula	C. B. Adams 1852	Chrysallida	NA	NA	use as Chrysallida
pazana	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	NA	NA	leave as Turbonilla
pazensis	Turbonilla	Baker, Hanna & Strong 1928	NA	NA	Pyrgolampros	leave as Turbonilla
pedroana	Turbonilla	Dall and Bartsch 1903	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	syn of chocolata per Abbott
pedroana	Odostomia	Dall and Bartsch 1909	Ividella	(Ividella)	Ividella	use as Ividella
penascoensis	Turbonilla	Lowe 1935	NA	NA	Ptycheulimella	use Eulimella per Aartsen et al 1998
pentalopha	Turbonilla	Dall and Bartsch 1903	Mormula	(Mormula)	Mormula	leave as Turbonilla
pequensis	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	Pyrgiscus	use as Pyrgiscus
pericuana	Turbonilla	Strong 1949	NA	NA	Pyrgiscus	use as Pyrgiscus
periscelida	Turbonilla	Dall and Bartsch 1909	Mormula	(Mormula)	Mormula	leave as Turbonilla
pesa	Turbonilla	Dall and Bartsch 1910	NA	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
pesa	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	NA	use as Aartsenia
phalera	Turbonilla	Dall and Bartsch 1909	Mormula	NA	NA	leave as Turbonilla
phanea	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	NA	NA	leave as Turbonilla
phanea	Odostomia	Dall and Bartsch 1907	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
phanella	Odostomia	Dall and Bartsch 1909	Evalea	NA	Evalea	use as Evalea
pharcida	Odostomia	Dall and Bartsch 1907	Menestho	(Menestho)	Menestho	use as Menestho
photis	Crysallida	Carpenter 1856	Haldra	NA	NA	use as Haldra
pluto	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
poppei	Odostomia	Dall and Bartsch 1909	Egila	NA	NA	use as Egila
porteri	Odostomia	Baker, Hanna & Strong 1928	NA	NA	Miralda	use as Liamorpha per Aartsen et al 1998
pratoma	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
profundicola	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	(Strioturbonilla)	Salassiella	syn of stylina per Abbott
profundicola	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
prolongata	Chemnitzia	Carpenter 1856	Turbonilla	NA	NA	leave as Turbonilla
promeces	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	Chrysallida	syn of cincta per Wise
proxima	Noemia	de Folin 1872	Chrysallida	NA	NA	use as Chrysallida
pugetensis	Turbonilla	Bartsch 1917	NA	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
pulcherrima	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	Chrysallida	syn of cincta per Wise

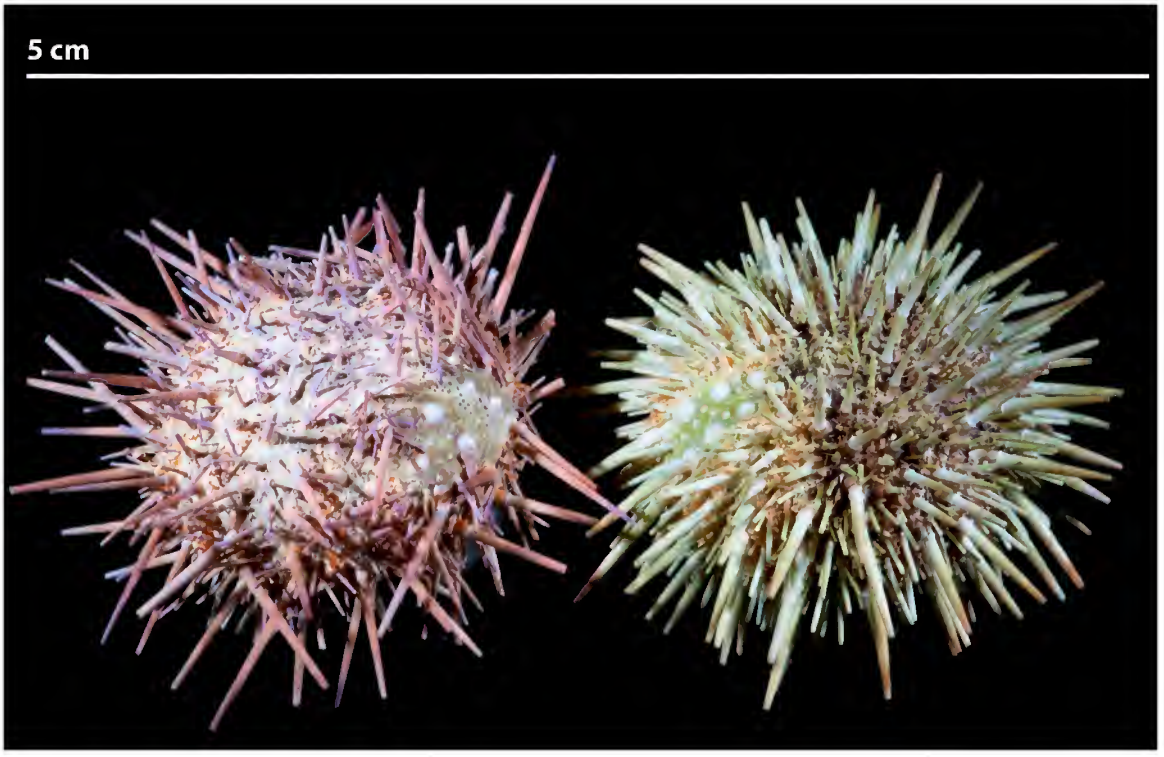
pulchra	Noemia	De Folin 1872	Chrysallida	NA	NA	use as Chrysallida
pulcia	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	Chrysallida	syn of cincta per Wise
pupiformis	Odostomia	Carpenter 1865	NA	NA	NA	Aartsenia per McLean 2007
quadrae	Odostomia	Dall and Bartsch 1910	NA	(Evalea)	Evalea	use as Evalea
quinquecincta	Parthenia	Carpenter 1856	Ividella	NA	Ividella	use as Ividella
rangii	Chemnitzia	De Folin 1867	Scalenostoma	NA	NA	use as Eulimastoma
*raymondi	Turbonilla	Dall and Bartsch 1909	Chemnitzia	(Chemnitzia)	Chemnitzia	leave as Turbonilla
raymondi	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	use as Evalea
recta	Odetta	de Folin 1872	Menestho	NA	NA	use as Menestho
recta	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
*regina	Turbonilla	Dall and Bartsch 1909	Mormula	(Mormula)	Mormula	leave as Turbonilla
reigeni	Chrysallida	Carpenter 1856	Chrysallida	NA	NA	use as Chrysallida
resina	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
richi	Odostomia	Dall and Bartsch 1909	Salassiella	(Salassiella)	Salassiella	use as Salassiella
ridgwayi	Turbonilla	Dall and Bartsch 1909	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
rinella	Turbonilla	Dall and Bartsch 1910	NA	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
rinella	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	NA	use as Chrysallida
*ritteri	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	Chrysallida	use as Chrysallida
sanctorum	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	Pyrgiscus	use as Pyrgiscus
sanctorum	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	Chrysallida	syn of cincta per Wise
sanjuanensis	Odostomia	Bartsch 1920	NA	(Amaura)	Amaura	use as Aartsenia
*santarosana	Turbonilla	Dall and Bartsch 1909	Chemnitzia	(Chemnitzia)	Chemnitzia	leave as Turbonilla
santarosana	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
santosana	Turbonilla	Dall and Bartsch 1909	Mormula	NA	Mormula	leave as Turbonilla
sapia	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	Chrysallida	syn of cincta per Wise
satura	Odostomia	Carpenter 1865	Amaura	(Amaura)	Amaura	use as Aartsenia
scalariformis	Parthenia	Carpenter 1856	Salassia	NA	NA	use as Salassia
scammonensis	Turbonilla	Bartsch 1912	NA	NA	Mormula	leave as Turbonilla
scammonensis	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	NA	use as Chrysallida
schmitti	Turbonilla	Bartsch 1917	NA	NA	Strioturbonilla	leave as Turbonilla
sebastiani	Turbonilla	Bartsch 1917	NA	NA	Mormula	leave as Turbonilla
sedillina	Turbonilla	Dall and Bartsch 1909	Dunkeria	NA	NA	leave as Turbonilla
septentrionalis	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
serilla	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	use as Evalea
serrae	Turbonilla	Dall and Bartsch 1907	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
shimeki	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	NA	use as Pyrgiscus
shuyakensis	Turbonilla	Bartsch 1927	NA	NA	Pyrgolampros	leave as Turbonilla
signae	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
sillana	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	Amaura	use as Aartsenia
simpsoni	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
sitkaensis	Odostomia	Clessin 1900	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
skidegatensis	Odostomia	Bartsch 1912	NA	(Evalea)	Evalea	use as Evalea
smithsoni	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	NA	NA	leave as Turbonilla

socorroensis	Odostomia	Dall and Bartsch 1909	Evalea	NA	NA	syn of tenuisculpta per Abbott
spreadboroughi	Odostomia	Dall and Bartsch 1910	NA	(Evalea)	Evalea	use as Evalea
stelleri	Turbonilla	Bartsch 1927	NA	NA	Pyrgolampros	leave as Turbonilla
stenogyra	Turbonilla	Dall and Bartsch 1909	Careliopsis	NA	Careliopsis	use as Careliopsis
stephanogyra	Turbonilla	Dall and Bartsch 1909	Strioturbonilla	NA	NA	leave as Turbonilla
stephensi	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
stillmani	Turbonilla	Smith & Gordon 1948	NA	NA	Pyrgolampros	leave as Turbonilla
straminea	Odostomia	Carpenter 1865	NA	NA	Evalea	syn of tenuisculpta per Abbott
striosa	Chemnitzia	C. B. Adams 1852	Pyrgiscus	NA	NA	use as Pyrgiscus
strongi	Turbonilla	Willett 1931	NA	NA	Pyrgolampros	leave as Turbonilla
strongi	Odostomia	Bartsch 1927	NA	NA	Evalea	use as Evalea
stylina	Chemnitzia	Carpenter 1864	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
subangulata	Dunkeria	Carpenter 1856	Dunkeria	NA	NA	leave as Turbonilla
subcuspidata	Turbonilla	Carpenter 1864	NA	NA	Pyrgiscus	syn of tenuicula per Abbott
subdotella	Odostomia	Hertlein and Strong 1951	NA	NA	Eulimastoma	use as Eulimastoma
subglobosa	Odostomia	Bartsch 1912	NA	(Amaura)	Amaura	use as Aartsenia
sublirulata	Odostomia	Carpenter 1856	Menestho	NA	NA	use as Menestho
subturrita	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	Amaura	use as Aartsenia
subula	Turbonilla	Mörch 1859	Pyrgiscus	NA	NA	use as Pyrgiscus
superba	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	NA	Pyrgiscus	use as Pyrgiscus
swani	Turbonilla	Dall and Bartsch 1909	Pyrgisculus	(Dunkeria)	NA	leave as Turbonilla
tacomaensis	Odostomia	Dall and Bartsch 1907	Evalea	(Evalea)	Evalea	use as Evalea
talama	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	NA	use as Chrysallida
talma	Turbonilla	Bartsch 1910	NA	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
talpa	Odostomia	Dall and Bartsch 1909	Amaura	(Amaura)	NA	use as Aartsenia
taylori	Turbonilla	Dall and Bartsch 1907	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
tecalo	Turbonilla	Bartsch 1917	NA	NA	Pyrgiscus	use as Pyrgiscus
telescopium	Chrysallida	Carpenter 1856	Chrysallida	NA	NA	use as Chrysallida
terebralis	Turbonilla	Carpenter 1857	NA	NA	Pyrgiscus	syn of tenuicula per Abbott
*tenuicula	Chemnitzia	Gould 1853	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	Pyrgiscus per McLean 2007
tenuis	Odostomia	Carpenter 1856	Evalea	NA	NA	use as Evalea
*tenuisculpta	Odostomia	Carpenter 1864	Evalea	(Evalea)	Evalea	Evalea in McLean 2007
terebellum	Cingula	C. B. Adams 1852	Miralda	NA	NA	use as Liamorpha per Aartsen et al 1998
terricula [see turricula]	Odostomia	Dall and Bartsch 1903	Ivara	(Ivara)	NA	lapsus
thalia	Odostomia	Bartsch 1912	NA	(Chrysallida)	Chrysallida	use as Chrysallida
thea	Odostomia	Bartsch 1912	NA	(Evalea)	Evalea	use as Evalea
tillamookensis	Odostomia	Dall and Bartsch 1907	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
tolteca	Turbonilla	Baker, Hanna & Strong 1928	NA	NA	Pyrgiscus	use as Pyrgiscus
torrita	Chrysallida	Dall and Bartsch 1909	Chrysallida	NA	NA	use as Chrysallida
torquata	Chemnitzia	Gould 1853	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	leave as Turbonilla
trachis	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	Chrysallida	use as Chrysallida
tremperi	Turbonilla	Bartsch 1917	NA	(Pyrgolampros)	Pyrgolampros	leave as Turbonilla
tremperi	Odostomia	Bartsch 1927	NA	NA	Chrysallida	use as Chrysallida

tridentata	Turbonilla	Carpenter 1865	Mormula	(Mormula)	Mormula	leave as Turbonilla
tropidita	Salassia	de Folin 1872	Salassia	NA	NA	use as Salassia
truncatula	Menestho	Odhner 1915	NA	NA	NA	Menestho [added per P. Lafollette]
turricula	Odostomia	Dall and Bartsch 1903	Ivara	NA	Ivara	use as Ivara
turrita	Chemnitzia	C. B. Adams 1852	Asmunda	NA	NA	leave as Turbonilla
tyleri	Odostomia	Dall and Bartsch 1909	Chrysallida	NA	NA	use as Chrysallida
ulloa	Turbonilla	Bartsch 1917	NA	NA	Pyrgiscus	use as Pyrgiscus
ulloana	Odostomia	Strong 1949	NA	NA	Ividella	use as Ividella
unalashkensis	Odostomia	Dall and Bartsch 1909	Evalea	(Evalea)	Evalea	use as Evalea
undata	Chemnitzia	Carpenter 1856	Strioturbonilla	NA	NA	leave as Turbonilla
unifasciata	Turbonilla	Carpenter 1857	NA	NA	Pyrgiscus	syn of turicula per Abbott
valdezi	Turbonilla	Dall and Bartsch 1907	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	syn of aurantia per Abbott
valdezi	Odostomia	Dall and Bartsch 1907	Evalea	(Evalea)	NA	syn of tenuisculpta per Abbott
valeroi	Odostomia	Bartsch 1917	NA	NA	Evalea	use as Evalea
vancouverensis	Chemnitzia	Baird 1863	Strioturbonilla	(Strioturbonilla)	Strioturbonilla	syn of torquata per abbot
vancouverensis	Odostomia	Dall and Bartsch 1910	NA	(Evalea)	Evalea	use as Evalea
vexativa	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
vicola	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	Chrysallida	syn of cincta per Wise
victoriana	Turbonilla	Dall and Bartsch 1907	Pyrgolampros	(Pyrgolampros)	Pyrgolampros	syn of aurantia per Abbott
vincta	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	NA	syn of cincta per Wise
virginalis	Odostomia	Dall and Bartsch 1909	Chrysallida	(Chrysallida)	Chrysallida	use as Chrysallida
virgo	Chemnitzia	Carpenter 1865	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
vivesi	Turbonilla	Hertlein and Strong 1951	NA	NA	Pyrgiscus	use as Pyrgiscus
vizcainoana	Odostomia	Baker, Hanna & Strong 1928	NA	NA	Chrysallida	use as Chrysallida
viszainoi	Turbonilla	Bartsch 1917	NA	NA	Mormula	leave as Turbonilla
washingtonia	Odostomia	Bartsch 1920	NA	(Amaura)	Amaura	use as Aartsenia
weldi	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
whitei	Odostomia	Bartsch 1927	NA	NA	Evalea	use as Evalea
wickhami	Turbonilla	Dall and Bartsch 1909	Pyrgiscus	(Pyrgiscus)	Pyrgiscus	use as Pyrgiscus
willetti	Turbonilla	Smith & Gordon 1948	NA	NA	Pyrgolampros	leave as Turbonilla
willetti	Odostomia	Bartsch 1917	NA	(Evalea)	Evalea	use as Evalea
yolettae	Turbonilla	Hertlein and Strong 1951	NA	NA	Pyrgiscus	use as Pyrgiscus
youngi	Odostomia	Dall and Bartsch 1912	NA	(Evalea)	Evalea	use as Evalea
ziziphina	Parthenia	Carpenter 1856	Menestho	NA	NA	Oscilla per P. Lafollette

SOUTHERN CALIFORNIA ASSOCIATION OF MARINE INVERTEBRATE TAXONOMISTS

Jan-Feb/March-April, 2011 SCAMIT Newsletter Vol. 29, No. 5&6



Two forms of juvenile *Strongylocentrotus purpuratus.* The animal on the left is from CSD station 2074, 14 July 95, 100m. The animal on the right is from OCSD station T12(3), 18 Jan 2011, 57m.

This Issue

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The SCAMIT newsletter is not deemed to be a valid publication for formal taxonomic purposes.

24 January 2011, Echinoderm Literature Review and Various Echinoderm Taxonomy Issues, CSD.

Attendance: Megan Lilly, CSD; Don Cadien, LACSD; Ron Velarde, CSD (business only); Wendy Enright, CSD (business only); Cheryl Brantley, LACSD; Kathy Langan, CSD; Tony Phillips, CLAEMD; Dan Ituarte, CSD –retired; Katie Beauchamp, CSD; Larry Lovell, LACSD; Christina Thomas, OCSD; Laura Terriquez, OCSD.

The meeting was opened by Larry Lovell announcing upcoming meetings. 14 February 2011 will see SCAMIT members meeting at the Dancing Coyote Ranch also known as Dancing Coyote Environmental, home of John Ljubenkov. John will be reviewing pertinent cnidaria literature as well as some cnidaria taxonomy and Tony Phillips will lead a review of pertinent flatworm literature.

The 14 March 2011 meeting at Orange County Sanitation Districts will cover all the "left over" miscellaneous groups that have not had a literature or taxonomic review since the B'08 project. The topics covered and those reviewing them are as follows: Ascidians – Megan Lilly; Echiurans – Megan Lilly; Sipunculids – Megan Lilly; Enteropneusts – Tony Phillips; Phoronids – hopefully Eric Hochberg; Sponges – Don Cadien; Brachiopods and Bryozoans – Don Cadien; Entoprocts – Kelvin Barwick; Cephalochordates – Wendy Enright; Nematodes – Don Cadien.

UPCOMING MEETINGS - 2012

June 11 - Polychaetes at NHMLAC, Education Room. We will be reviewing *Travisia* species (*T. brevis, T. gigas, T. pupa*), *Brada pilosa* vs. *B. pluribranchiata* and one additional polychaete group.
July - NO MEETING - SUMMER VACATION
August 27 - Spionids at NHMLAC, Education Room. Dr. Vasily Radashevsky will be visiting NHMLAC. He is a world expert on the polychaete family Spionidae and will present on his current research interests. In addition, if anyone has problems in a particular area of spionid taxonomy, we will ask him to address it. Please send an email directly to Leslie or Larry with suggested spionid topics.
October TBD - Sponge meeting at NHMLAC. Dr. Dave Elvin, 2nd co-author of *The Sponges of California*, will be visiting the museum to review material in its sponge collection. The exact meeting content is yet to be determined, but a talk on his Oregon work, a sponge workshop, or computer session demonstrating the California and/or Oregon program are all possibilities.
November TBD - A review of *Lirobittium* and *Tellina* issues which arose during B'08. The meeting will be held at OCSD and lead by K. Barwick.
December 10 - A review of Amphiuridae, Phyllophoridae, and *Parastichopus* issues which arose during B'08. The meeting will be held at CSD and lead by M. Lilly

After the March meeting we will need to start our series of B'08 Specialty Taxonomy Group Workshops. Tony Phillips will be leading a workshop on the Enoplans based on his work during the B'08 project. John Ljubenkov will be leading a workshop in April on B'08 Cnidarians, and Ron Velarde will lead a workshop on B'08 Syllids, date TBD.

It was at that time Larry mentioned that the Species List Review Committee will need to start meeting as well, to discuss emends and additions for the upcoming Ed 6 of the Species List. These meetings will be held separately and are not considered general attendance SCAMIT meetings.

Larry suggested holding another Morphbank Image Workshop. Deb Paul at Morphank has suggested a two part workshop. The morning would be devoted to inputting a few images using the older online system so participants could see exactly the kinds of metadata associated with each image. The afternoon would be an introduction to, and opportunity to use, the new

spreadsheet image uploading method. Kelvin Barwick used this method for the aplacophoran image uploading and helped work out some of the bugs.

Next a discussion ensued regarding having another Barcoding SCAMIT workshop. There was some concern among members present that many of us don't even know the results of the first workshop and whether or not the original effort was successful. To that effect it was decided that there should be a meeting which will give an over-view of the data produced from the initial barcoding effort and members can discuss the results.

Larry announced some upcoming non-SCAMIT meetings: The annual SCAS meeting will be held Friday and Saturday, May 6-7, 2011 at California State Polytechnic University, Pomona. SCAMIT will likely have a table at this venue. Another upcoming meeting, the WSM, will have an international flair this year. They are combing their 44th Annual meeting with the 12th biannual meeting of the Sociedad Mexicana de Malacología. The meetings will be held June 27-30, 2011, in La Paz, Baja California Sur, México at the Instituto Politécnico Nacional, Centro Interdisciplinario de Ciencas Marinas.

Next on the agenda was a discussion on the upcoming elections for SCAMIT officers. Larry put a call out for nominations which will be open until the end of February. He urged people to consider running for a position on the SCAMIT board. Once nominations close, ballots and candidate statements will be sent out in March.
The discussion regarding SCAMIT officers closed the business portion of the meeting and it was on to echinoderms.

The first echinoderm order of business was to touch briefly on the problem of juvenile *Molpadia intermedia*. Small *M. intermedia* have numerous and large anchor ossicles which actually pierce the skin and stick up and out of the individual. They are associated with "racquet-shaped" plates in the body wall. As adults, the animals have lost all the ossicles in the body wall and have only phosphatic bodies. Ossicles remain in the caudal appendage, however. Due to this change in ossicle nature, juveniles look very different from their adult counter-parts. It was suggested that people make an adjustment to the key in Bergen 1996 (MMS Atlas) to indicate the juvenile character state. The ossicles are illustrated nicely on page 212. This discussion of *Molpadia intermedia* lead to a perusal of the literature and it was briefly noted that we should perhaps be aware of the possibility of encountering *M. musculus*. To read more about *M. musculus* and ascertain its difference from *M. intermedia*, see Clark 1907 which is available on-line. Separation of the two species involves caudal appendage ossicles. There will be large, fusiform rods present in the tail of *M. musculus* but not present in *M. intermedia*. Megan stated that she will check the next few *M. intermedia* specimens she sees, just to be sure…

Pertinent echinoderm literature from the last 5 years was discussed next. A bibliography, created by Don Cadien, was distributed (and is attached to this newsletter) which lists only those articles that he feels could have some application locally. In some instances there are direct affects, as in the case of the paper by Claude Massin and Michel Henrickx (2010) where they state that the animal discovered during the B'03 project and identified as *Synallactes alexandri*, is actually their new species, *S. virgulasolida*.

In other instances, the articles chosen may have only an indirect connection to our fauna, but may have some potentially interesting life history information that is applicable to a local genus, or they could cover environmental concerns that are ubiquitous to the world oceans.

With that it was time to start discussing problematic specimens. Megan Lilly had encountered an abundance of small, unknown Phyllophorids from B'08 station 7527, which was near Santa Cruz Island at a depth of 42 m. A majority of the specimens did not meet the 1cm size criteria for an attempt at species level ID. However, sadly, a few of them did… There was a subset of darkly colored individuals (light to medium brown) and the rest were the classic "off-white" color and had similar gestalt. However upon ossicle examination, two distinct types revealed themselves within the white cohort. Megan created 3 provisional species based on ossicle, and external differences. She placed them all in the family Phyllophoridae due to the nature of the extensions on the calcareous ring and named them as follows: Phyllophoridae sp SD 2, Phyllophoridae sp SD 3 and Phyllophoridae sp SD 4. At the meeting Megan showed images of the ossicles from each provisional species and passed the animals around for perusal by those present. After some discussion, the possibility of *Stolus trachyplaca* was offered as a possible ID for Phyllophoridae sp SD 3. Megan will be reviewing the specimens and the available literature further. As for Phyllophoridae sp SD 2 and SD 4, no one present recognized them or had any suggestions. Part of the problem is the relatively small size of the animals. Most of the specimens are between 1-2 cm and quite possibly do not have adult ossicle morphology. These animals may be left at their family level provisional ID's until perhaps future Bight projects can sample larger adult specimens from the same area that may shed some light on their identity.

The next topic for discussion was the possible confusion of *Petamera populifera* with *P. rigida* if one is not careful. Externally, the gestalt of the two animals is dissimilar. However, there can be some mistakes made in recognizing the ossicles as there is some confusion in the literature. Lambert (1997) and Lambert (1998), makes multiple statements that he suspects *P. rigida* is being confused in collections with both *P. populifera* as well as *P. lissoplaca*. Specifically he feels that some of the specimens referenced in Bergen (1996) as *P. populifera* are actually *P. rigida*. If one looks at the ossicle drawings in Bergen (1996), page 240, they resemble, especially the supporting tables, those described for *P. rigida* in Lambert (1998). Megan just wanted to caution those present to be careful when identifying any of the *Pentamera*s, and to reference the ossicle drawings and descriptions in Lambert (1998). She will be looking into this problem further and has plans to compare introvert ossicles from the various species.

Christina Thomas from OCSD had brought a juvenile *Strongylocentrotus* specimen for examination. It had been collected in their trawls and was associated with a kelp holdfast. It was green in color and while most people thought it might simply be a small, green *S. purpuratus*, not everyone was convinced. The color difference wasn't the only reason for the confusion (it is not uncommon to find green juvenile *S. purpuratus*), as upon comparison to a similar-sized voucher specimen of *S. purpuratus* there appeared to be a morphology difference of the spines as well as an over-all gestalt discrepancy (see cover photo). The specimen was then compared to images of *S. droebachiensis* and appeared similar, which caused a stir as *S. droebachinesis* is considered a strictly northern species. Light's Manual was then referenced and a few primary spines were removed to examine the structure of the spine tubercle. Based on the key in Light's and the morphology of the primary spine tubercle (no "neck") the animal was *S. purpuratus*. However, images comparing the OCSD specimen with the vouchered *S. purpuratus* were sent to Dr. Mooi at Cal Academy, and he kindly took the time to view them. He felt that the "mystery" animal was probably a juv *S. purpuratus*, but he couldn't say for sure. If Megan ever makes the journey to Cal Academy she will bring the specimen with her (with OCSD's permission) to have him examine it in person.

With time running out, the last specimen of the day was brought forth. It was the mystery Goniasterid from the B'08 trawls and was being revisited for a second time. Megan had very tentatively identified it to *Gephyreaster swifti* but wasn't willing to stake her reputation on the ID. Others present compared it to images and keys in Fisher 1911 and thought that species was a good possibility, but there was still uncertainty. Megan will try to get to the Scripps Benthic Invertebrate Collections and compare it to a vouchered specimen of *G. swifti*. If she is still unsure after that exercise the specimen will be sent to Dr. Christopher Mah at the Smithsonian for further examination and hopefully a final identification. This animal, whatever it may be, was present in high abundances at B'08 station 7615 which was in 400m of water off Santa Cruz Island. A final identification would be helpful if this is a common deep water species in the Southern California Bight. ***Follow up** – Since this meeting the animal was sent to Dr. Mah and he identified it as *Pseudarchaster pusillus*. This ID was not arrived at earlier as the animal had some features that Megan thought inconsistent with *P. pusillus*. Additionally it just didn't "look like" the "standard" *P. pusillus* seen in local samples. However, she was using Fisher (1911), and was advised by Dr. Mah that there are some inconsistencies in that publication and that Ludwig (1905) would have been more useful in this instance. The character differences noted by Megan are unexplained at this time.

14 February 2011, Other Phyla and Flatworm Literature Review, Dancing Coyote Environmental

Attendance: Larry Lovell, LACSD; Terra Duvall, LACSD; Tony Phillips, CLAEMD; Laura Terriquez, OCSD; Ken Sakamoto, OCSD; Don Cadien, LACSD; John Ljubenkov, DCE; Megan Lilly, CSD; Wendy Enright, CSD.

The meeting started with upcoming meeting announcements. Attendees were reminded that our next meeting will be 14 March at OCSD. We will complete, at that time, whatever we are unable to finish today. April 11 will see us back at Dancing Coyote Environmental to review Bight'08 cnidarian specimens. Larry then announced that he wants to schedule a cirratulid meeting for some time in 2011. This year's SCUM meeting will be March 5th at SCCWRP with the following year's being scheduled at the Cabrillo Marine Aquarium. Larry updated us on the current state of the SCAMIT elections. The current slate of officers were nominated and nominations are now closed. Ballots will go out in the following week and results will be announced next month. And with that it was time to move on to the purpose of the day, cnidarian and flatworm literature review.

John Ljubenkov started out on an aesthetic note by showing us a book titled - *Drawing Upon Nature: Studies for the Blaschkas' Glass Models* – (the following excerpt is copied from the website: http://glassmarket.cmog.org/) "Selected and introduced by Susan M. Rossi-Wilcox and David Whitehouse. Written as a supplement to The Corning Museum of Glass's 2007 major summer exhibition, "Botanical Wonders: The Story of the Harvard Glass Flowers," this book is a collection of brilliantly detailed drawings made by Rudolf Blaschka as studies for the delicate glass flower and invertebrate models that he and his father, Leopold, created for Harvard University in the late 19th century".

John then proceeded to recommend a few websites that he finds useful:

The world hydrozoa database - www.marinespecies.org/hydrozoa. This site has many of the name changes coming online and seems to be well-maintained by eminent experts on the various groups.

The biodiversity heritage library is another useful site - www.biodiversitylibrary.org

If you visit the hexacorallia of the world website, http://hercules.kgs.ku.edu/hexacoral/anemone2/index.cfm, you can search on taxonomic data and occasionally dig out descriptions of species. There are no keys but John still feels it's a useful tool.

John recommends http://www.actiniaria.com/ for a plethora of good anemone images.

In the bibliography at the end of this newsletter are just a few of the papers from John's recommended literature list. The entire list will be posted on the SCAMIT website in the Taxonomic Tools box.

John recommends Peter Schuchert as a prolific author on things related to hydroids. And, author P.F.S. Cornelius is a good source of information regarding *Obelia* spp.

With the literature review complete we moved on to discussing cnidarians topics. John was asked to briefly review the differences between Ceriantharia and Actiniaria. Some of the primary features to note specific to Ceriantharia, and which distinguish the Order, are – two rings of tentacles; an absence of a foot or a physa although there will be a terminal pore at the base of the animal; a relatively long column, and no oral disk.

We touched on a new species of *Haliclystus* which attaches by its umbrella (upside down) to algae. Also in his sample processing John found a "cool critter" in the genus *Candelabrum* that looks like a baseball bat covered in capitate tentacles. He found this animal living on algae.and also found it in the Long Beach breakwater.

We were then cautioned to watch out for *Halcampella* as it can be confused with *Halianthella* or *Edwardsia*.

We moved into a brief discussion on Edwardsiids, specifically differentiating *Scolanthus scamiti* and *Edwardsia californica* which can co-occur in marinas and bays. When in doubt, do pneumatocyst smears.

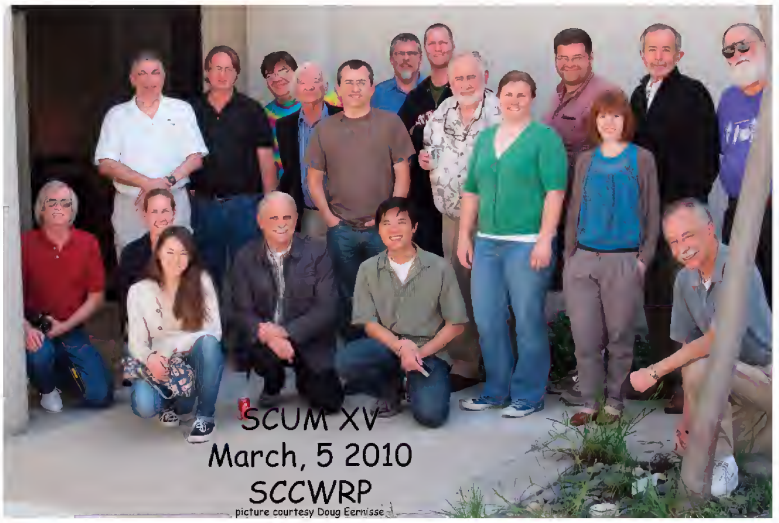
With cnidaria wrapped up for the time being Tony Phillips took the floor and handed out literature lists of pertinent Nemertea and Polycladida papers. He did us all a favor by organizing them with reference to whether or not they were locally applicable, whether they contained useful keys, whether they were more of a general resource, etc. The electronic versions of these lists are unavailable at this time, but should be posted on the SCAMIT website at some point in the near future.

Tony emphasized the fact that researchers working on polyclad systematics serial section the reproductive structures. However, these features are not of practical use for applied taxonomy in a monitoring program. Tony relies more heavily on eye pattern and key morphological characters. He then informed us that his Enopla presentation this fall and will not only cover the B'08 enoplans, but will cover all of the Southern California Bight and what he's learned over his years of working on them (or them working on him...).

14 March 2011, Other Phyla Literature Review Part II, OCSD

Attendance: Larry Lovell, LACSD; Don Cadien, LACSD; Terra Duvall, LACSD; Laura Terriquez, OCSD; Ken Sakamoto, OCSD; Megan Lilly, CSD; Wendy Enright, CSD; Kelvin Barwick, OCSD; Tony Phillips, CLAEMD.

The theme of the meeting was the continuation of a review of Other Phyla literature updates including, nematodes, kinorhynchs, entoprocts, ectoprocts, sponges, urochordates, hemichordates, and cephalochordates.



During the business portion of the meeting Kelvin gave a report on March's SCUM meeting. Larry then provided an update on SCCWRP's Barcoding project. Peter Miller will be leaving SCCWRP at the end of March to work at BOLD. There is an upcoming information meeting later this month where Peter will explain his new role at BOLD and introduce Eric Stein, who will now lead the SCCWRP Barcoding effort. Eric Pilgrim (EPA Cincinnati Lab) will be at the meeting to discuss progress on barcoding SCB specimens. The idea of SCCWRP and/or SCAMIT hosting a barcoding seminar at a SCAS annual meeting was also discussed. And lastly, Kelvin reminded those attending of the upcoming WSM/AAMA meeting in La Paz, Mexico.

Megan started off the main meeting by telling us that she had not been able to put together anything on the urochordates, but would send around something via e-mail shortly. Kelvin then said that he had nothing to circulate or report on either kinorhynchs or entoprocts, and that, although there was some potentially interesting literature available, he had not yet received it. There are no apparent changes to the Ed. 5 list or local practice in either of these groups. Our string of strike-outs continued with Wendy, who reported nothing new in cephalochordates, and no new literature of any applicability.

Tony Phillips finally had something to circulate on the enteropneusts. He passed out a list of literature for the group, including 16 titles. He specified four of these as being particularly noteworthy. He included Keith Woodwick's section of the Taxonomic Atlas on the group, and also his treatment in the Light and Smith Manual in 2007. He also mentioned two papers which have local applicability: one, a revision of the family Harrimaniidae (Deland 2010) and the second, a revision of the genus *Saccoglossus* (Cameron 2010). Using these we can now probably move beyond the current level of generic identification in some cases. Tony indicated that he believes the local shallow-water *Saccoglossus* is *S. pusillus* based on several characters. We need to have a meeting concerning these new resources, and how they apply to our material. Megan Lilly offered to hold an enteropneust meeting, but suggested that we should try and gather as

much material as possible from our collections to aid in our examination of the group. Most of the specimens taken are too incomplete for any detailed analysis, so a pool of more adequate material needs to be established. A tentative date of June was set for an enteropneust meeting. All potential participants need to examine their material, and select specimens for examination from archival and new material. Once the amount of material available from each agency is known, the information should be forwarded to Megan.

Don Cadien then proceeded with a discussion of updates for four groups: sponges, nematodes, ectoprocts, and brachiopods. But before we tackled these groups some new general literature on higher level relationships in the invertebrates was mentioned. A grand overview from 2007 (A modern look at the animal tree of life), and a look at the lophotrochozoa (Assembling the lophotrochozoan tree of life), also from 2007. In the following year an overview of the Ecdysozoa (The Evolution of the Ecdysozoa) was published. These help view the relationships between the phyla under consideration during the meeting, and were recommended to those present as useful overviews.

We started the discussion of individual phyla with the Nematoda. This is a group that none of the members identify past "nematoda" in their samples. The SCAMIT Ed. 5 list does not have specific nematode IDs, and they were not identified in Bight'08. There is, however, a good new treatment of many of the Southern California Bight species. This, by Dwayne Hope, came out in 2007 in the new Light and Smith Manual. Well illustrated, and fairly comprehensive for the shallow-water to intertidal forms, it none-the-less fails to provide coverage of many subtidal forms. Still, a useful addition to our local literature. Those interested might begin to attempt identification of nematodes taken in their monitoring. The first nematode to be added to the SCAMIT listing would have to be *Bolbella californica*, an enormous species taken not uncommonly in shallow shelf depths in the SCB. Although originally described by Allgen in 1951, it was redescribed by Gil Jones in 1964. Size alone will serve to characterize adults of this species, but juveniles will be more difficult to separate. It seems unlikely that much work will be done on the group locally until new requirements are instituted in monitoring permits, but at least now there is a valuable new tool available to help us.

The phylum Brachiopoda has not had significant new literature added since issuance of Ed. 5 of the SCAMIT Species List. Hochberg did a treatment of the group in the new Light and Smith Manual, but this had significantly fewer species included than did his treatment in the Taxonomic Atlas series a decade earlier. Since the Manual dealt only with intertidal forms, and few brachiopods extend that shallow, it is far better to consult the Taxonomic Atlas brachiopod treatment than that in the new Manual. One additional reference was brought forward dealing with the ecology of *Terebratalia transversa* (Tomasovych 2008). Otherwise no change in either nomenclature or available literature in the last few years.

The phylum Ectoprocta has a similar history in local literature. There is a new treatment of the group in the Light and Smith Manual by Soule et al, but this is less complete than their treatment in the Taxonomic Atlas. There appear to be no nomenclatural changes flowing from the new publication to species reported by SCAMIT member agencies. Some useful discussion is presented in the paper concerning endemicity and the application of European species names to the local fauna. As molecular information accumulates, and as redefinitions of older European forms proceed, fewer of the original identifications of Eastern Pacific species appear supportable. While Osborn and other earlier workers attributed many of the local forms to known European species, this appears to often not be accurate. There are, of course, introductions (particularly in

bay and estuarine situations) of European species into local waters, and so some of those forms can legitimately be reported from the area. The native fauna, however, seems to have few if any circum-arctic species distributions which place species in both the North Atlantic and the temperate Eastern Pacific. For instance, identifications of *Alcyonidium* species taken in California and attributed to European stem forms are, according to Ryland [quoted by Soule et al 2007], inaccurate. The local forms probably represent a cluster of at least 5 new species, not allied with the European nominate species they have been identified as in the past. One ecological paper (Barnes et al 2007) discussing growth rate and variability was also mentioned, although it used Antarctic species as its basis. It may assist in interpreting these issues in the local biota.

Last but certainly not least were the sponges. One of the papers mentioned supports the paraphyly of the traditional "Porifera" and thus the separation of the Phyla Silicea and Calcarea from that morphological grade (Sperling et al 2009). This is the position followed in the SCAMIT Ed. 5 list. Most of the literature presented dealt with family level reviews from other areas, and integration of more molecular data along with morphological data in sponge systematics. There are no apparent nomenclatural issues raised in any of these citations that affect the Ed. 5 list, or the basis for future regional sponge identification. While not listed among the titles of interest, the core and essential sponge identification guide to our area was mentioned at the meeting - Lee, Welton L., David W. Elvin, and Henry M. Reiswig. 2007. *The Sponges of California. A guide and key to the marine sponges of California.* Monterey Bay Sanctuary Foundation. 395pp. The sponge portion of the Light and Smith Manual, also from 2007, by Lee et al is useful, but completely overshadowed in utility by the Sponges of California volume. De Laubenfels has finally been superceeded by a work both quite comprehensive and well constructed. While extensive descriptions of all the species considered are not provided, their essential morphological features and methods of distinguishing among related forms are carefully presented. Fortunately the reference was available in time for inclusion of changes embodied in it in the Ed. 5 list. Despite this, a number of additional species were added subsequent to the Ed. 5 list based on collection in Bight '08, or agency monitoring. These are currently among the emendations to be addressed in preparation of the upcoming on-line Taxonomic Listing due in July of this year.

After completion of discussion on these groups, their literature, and current status, we broke for lunch. Following lunch we were informed of some exciting new species records from recent sampling by the City of San Diego. On kelp collected locally and brought into their lab for use in kelp toxicity testing, two species of live stauromedusae were obtained. While most specimens were of a species well known from local waters, *Manania gwilliami*, one was quite different. It turned out to be a new southern record of *Manania handi*, known previously from Puget Sound and northward. Megan Lilly showed us photos of both animals, as well as what appeared to be a basal outgrowth interpreted as a forming planula larva budding from the distal end of the stalk. Neither of these forms is currently on the SCAMIT Ed. 5 list, so they represent two new species additions, as well as the first inclusion of the Class Scyphozoa on the list; the others being holoplanktonic and thus excluded.

Speaking of new species to the list… a discussion then ensued concerning species being found in the ISS (Invasive Species Survey) in San Francisco Bay. The SCAMIT Species List will be expanded to include species outside our previous range of coverage with the caveat that the species considered for addition are identified and/or verified by a SCAMIT member or local expert in good standing.

We then repaired to the lab for consideration of a number of different specimens of mollusks, platyhelminths, and urochordates.

11 April 2011, B'08 Cnidaria, Dancing Coyote Environmental

Attendance: Megan Lilly, CSD; Larry Lovell, LACSD; Terra Duvall, LACSD; Tony Phillips, CLAEMD, Wendy Enright, CSD; John Ljubenkov, DCE; Don Cadien, LACSD

Larry Lovell opened the meeting with the first order of business which is always upcoming meetings: May will be a Cylindroleberididae workshop at CSD. The workshop will review species, the tools used to identify them, and character states. In June we will hold another Taxonomic database meeting at SCCWRP. There will be no meeting in July. Another Morphbank image submittal workshop is being considered for August but Larry needs to contact Deb Paul and check her availability. In September Megan Lilly will lead an Enteropneust workshop at Lillypad Environmental. Megan has asked that participants collect specimens for the meeting during their respective July survey work. October will have us enjoying an Enopla Bight'08 review with Tony Phillips at OCSD. November will be a review of the B'08 Syllidae with Ron Velarde at CSD.

With upcoming meetings covered, Larry then announced that Leslie had received the ballots and the current officers were reelected for another year. The initial meeting of the SCAMIT Species List Review committee was held Mon Feb 28 at SCCWRP. Don Cadien was elected Committee Chair. At the meeting we reviewed the purpose and goals of the group and set a July 1 target date for release of the Ed 6 species list.

With that it was time for John to review the B'08 Cnidaria. The bay species *Diadumene* sp and *Edwardsia californica* were dominant. John had put together a PowerPoint presentation on species he had identified and which will be available on the website. He also handed out a species list with abundances, images of primary species (whole body, dissection, pneumatocysts).

All in all in was a very informative presentation and hopefully we are that much more prepared for the Cnidaria of B'13.

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